We will begin momentarily at 2pm ET

Slides available now! Recordings will be available to ACS members after one week.

www.acs.org/acswebinars

Contact ACS Webinars ® at acswebinars@acs.org

Have Questions?

“Why am I muted?”
Don’t worry. Everyone is muted except the presenter and host. Thank you and enjoy the show.

Type them into questions box!

Contact ACS Webinars ® at acswebinars@acs.org
Have you discovered the missing element?

Find the many benefits of ACS membership!

www.acs.org/2joinACS

Benefits of ACS Membership

Chemical & Engineering News (C&EN)
The preeminent weekly news source.

NEW! Free Access to ACS Presentations on Demand®
ACS Member only access to over 1,000 presentation recordings from recent ACS meetings and select events.

NEW! ACS Career Navigator
Your source for leadership development, professional education, career services, and much more.

www.acs.org/2joinACS
Let’s get Social...post, tweet, and link to ACS Webinars during today’s broadcast!

facebook.com/acswebinars

@acswebinars

Search for “acswebinars” and connect!

How has ACS Webinars® benefited you?

“I enjoy the range of topics covered in ACS Webinars. They make for a fun Thursday afternoon enrichment activity. Thank you for organizing these presentations and to everyone who is so happy to share their research!”

Fan of the Week

Amy Goshe,
Assistant Scientific Information Specialist,
Chemical Abstracts Service

Be a featured fan on an upcoming webinar! Write to us @ acswebinars@acs.org
Learn from the best and brightest minds in chemistry!
Hundreds of webinars presented by subject matter experts in the chemical enterprise.

Recordings are available to current ACS members one week after the Live broadcast date. www.acs.org/acswebinars

Broadcasts of ACS Webinars® continue to be available to the general public LIVE every Thursday at 2pm ET!
Upcoming ACS Webinars

www.acs.org/acswebinars

Thursday, December 10, 2015

“Outsmarting the Shortage: The Emergence of Base Metal Catalysis in Pharma”

J. Chris McWilliams, Director of Process Chemistry, Pfizer
David Constable, Director of ACS Green Chemistry Institute, ACS
Joseph Fortunak, Professor of Chemistry, Howard University

While you are enjoying your holidays, discover the ACS Webinars Archive!

Learn from the best and brightest minds in chemistry.
Hundreds of webinars presented by subject matter experts in the chemical enterprise. Live every Thursday at 3pm ET!

We have a topic of interest for every chemist. Go ahead, dive into these diverse categories and discover our growing archive of past webinars.

www.acs.org/acswebinars

“Chemistry & the Economy: Global Outlook 2016”

David Harwell
Asst. Director of Industry Member Programs, ACS

Paul Hodges
Chairman, International eChem

Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact ACS Webinars at acswebinars@acs.org
Chemistry & the Economy: Global Outlook 2016

US$ rising, oil prices falling,
China’s new 5-Year Plan

- What to expect in 2016

3 December 2015

COMPANY BACKGROUND AND EXPERIENCE

**About IeC:** International eChem (IeC) is a London-based strategy consultancy advising Fortune 500 and FTSE 100 companies, investment banks and fund managers.

**Paul Hodges**

is a trusted adviser to major companies and the investment community, and has a proven track record of accurately identifying key trends in global marketplaces. He has been widely recognised for correctly forewarning of the 2008 global financial crisis.

Paul has presented the 6-monthly ACS ‘Chemistry & the Economy’ webinar series since 2009. He is co-author of the influential ebook ‘Boom, Gloom and the New Normal’, and his analysis of the key role of demographics in driving the global economy is now attracting increasing attention from senior policymakers and executives.

Paul is Chairman of IeC and non-executive Chairman of NiTech Solutions Ltd. Prior to launching IeC in 1995, Paul spent 17 years with Imperial Chemical Industries (ICI), both in England and the USA, where he held senior executive positions in petrochemicals and chloralkali, and was Executive Director of a $1 billion ICI business.

Paul is an invited member of the World Economic Forum’s Global Agenda Council, a Member of the Energy Institute and a Freeman of the City of London. He is a graduate of the University of York, and subsequently studied with the IMD business school in Switzerland.
SUMMARY

- Policymakers have spent 6 years and $tns ignoring the economic impact of demographic change
- The Great Unwinding of their policies is now well underway in financial markets
- China’s New Normal policies have been the catalyst
- Climate and demographic change will create major new opportunities

AGENDA

- The first webinar in October 2009
- Update on the US$ and oil markets
- China’s new 5-Year Plan for 2016 – 2020
- 2 big opportunities for 2016
**FUNDAMENTALS & SENTIMENT**

**THE BEN GRAHAM* INSIGHT**

*IN THE LONG-TERM, THE MARKET IS A WEIGHING MACHINE*

*IN THE SHORT-TERM, THE MARKET IS A VOTING MACHINE*

* BEN GRAHAM WAS THE MENTOR OF WARREN BUFFETT

**RECOVERY IN FINANCIAL MARKETS HAS MIRRORED OIL PRICE MOVES**

[Graph showing the relationship between WTI and S&P 500 prices over time.]

---

International Chem

CREATIVE ENERGY FOR IMPORTANT ISSUES
CRUDE OIL MARKETS

SUPPLY/DEMAND CLOSE TO BALANCE
SMALL CHANGES CAUSE MAJOR VOLATILITY

FUTURES: PHYSICALS RATIO NOW 13:1
FINANCIAL PLAYERS BUY CRUDE WHEN SELLING US$
AGENDA

- The first webinar in October 2009
- Update on the US$ and oil markets
- China’s new 5-Year Plan for 2016 – 2020
- 2 big opportunities for 2016

STIMULUS PROGRAMMES HAVE DISTORTED FINANCIAL MARKETS

CREATIVE ENERGY FOR IMPORTANT ISSUES

AND VASTLY INCREASED DEBT

What happened to deleveraging?

Across sectors and geographies there are troubling signs:

**CHINA’S debt is soaring**
- Quadrupled since 2007
- ~50% of loans linked to real estate
- Shadow banking growing at 36% p.a.

**HOUSEHOLDS borrow more**
- 80% of countries have higher debt
- 74% of household debt is mortgages
- 7 countries at risk

**GOVERNMENT debt is up**
- $25 trillion since 2007
- 75% of increase in advanced economies
- Exceeds 100% of GDP in 10 countries
- Projected to keep growing in Europe and Japan

SOURCE: MCKINSEY GLOBAL INSTITUTE, 2015

CREATIVE ENERGY FOR IMPORTANT ISSUES

MAJOR CHANGE IS UNDERWAY AS THE ‘GREAT UNWINDING’ OF POLICYMAKER STIMULUS CONTINUES

**THE ‘GREAT UNWINDING’ - BRENT OIL, US$$, US 10yr BOND %**

% change for Brent & US$ since 15 August 2014, and for US 10yr interest rates since 2015

SOURCE: The pH Report
THE CHINA-INSPIRED COMMODITY SUPER-BUBBLE IS COMING TO AN END

CHINA-RELATED COMMODITIES PRICING
% CHANGE SINCE JANUARY 2003

OIL, LIKE COAL, WILL BE LEFT IN THE GROUND
AS GAS GAINS MARKET SHARE FROM OIL
COAL STILL SUPPLIES A THIRD OF US POWER – MANY MINE OWNERS ARE FINANCIALLY DISTRESSED

US CRUDE OIL, NATURAL GAS & COAL PRODUCTION
1981 - 2014

MILLION TONNES OIL EQUIVALENT

<table>
<thead>
<tr>
<th>Year</th>
<th>US gas</th>
<th>US oil</th>
<th>US coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>750</td>
<td>500</td>
<td>350</td>
</tr>
<tr>
<td>1982</td>
<td>700</td>
<td>450</td>
<td>300</td>
</tr>
<tr>
<td>1983</td>
<td>650</td>
<td>400</td>
<td>250</td>
</tr>
<tr>
<td>1984</td>
<td>600</td>
<td>350</td>
<td>200</td>
</tr>
<tr>
<td>1985</td>
<td>550</td>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>1986</td>
<td>500</td>
<td>250</td>
<td>100</td>
</tr>
<tr>
<td>1987</td>
<td>450</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>1988</td>
<td>400</td>
<td>150</td>
<td>0</td>
</tr>
<tr>
<td>1989</td>
<td>350</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>1990</td>
<td>300</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>1991</td>
<td>250</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1992</td>
<td>200</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1993</td>
<td>150</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1994</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1995</td>
<td>50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1996</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1997</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1998</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1999</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOURCE: PwC REPORT ANALYSIS, DATA: BP ENERGY STATISTICS

IEA SAYS GLOBAL OIL DEMAND GROWS JUST 9% BY 2030 UNDER INITIAL COP21 COMMITMENTS

**Figure 2.2** Global primary energy demand by type in the INDC Scenario

Note: "Other renewables" includes wind, solar (photovoltaic and concentrating solar power), geothermal, and marine.

INDC = Individual Nationally Determined Contributions

CREATIVE ENERGY FOR IMPORTANT ISSUES
THE SWITCH TO HORIZONTAL DRILLING HAS ALREADY QUADRUPLED US OIL RIG PRODUCTIVITY

US OIL RIG PRODUCTIVITY
BARRELS/RIG, 2000 -

SOURCE: pR Report; data US ENERGY INFORMATION ADMINISTRATION, BAKER HUGHES

US OIL INVENTORIES REMAIN AT ALL-TIME RECORD LEVELS

US WEEKLY CRUDE OIL INVENTORY EX-SPR 1982 -

SOURCE: IAC Analysis, US ENERGY INFORMATION ADMINISTRATION

RECORD HIGH INVENTORY
CREATIVE ENERGY FOR IMPORTANT ISSUES

BRENT’S 200-DAY EMA NOW ACTING AS RESISTANCE - INSTEAD OF SUPPORT AS IN 2009

US OIL PRICES ARE NOW RE-CONNECTING WITH HISTORICAL RATIOS TO NATURAL GAS VALUES

- Oil has ~6x the energy content of natural gas, and normally trades at ~10x the WTI price
- The past few years may be a ‘new paradigm’
- ‘Reversion to the mean’ is normally one of the most profitable investment concepts
OIL PRICES HAVE AVERAGED $26/BBL SINCE 1861, EXCLUDING OPEC CRISIS AND LIQUIDITY BUBBLE

AGENDA

- The first webinar in October 2009
- Update on the US$ and oil markets
- China’s new 5-Year Plan for 2016 – 2020
- 2 big opportunities for 2016
CHINA’S NEW NORMAL UNWINDS ITS DEBTS

“The indomitable growth of the three decades since 1978 is no longer feasible. New Normal China is less interested in growth rates and more interested in quality and efficiency of growth: pushing forward reform, adjusting structure and trying to benefit the people.”

Xinhua, September 2014

“THE CONCEPT OF A “NEW NORMAL” FOR THE WORLD’S SECOND LARGEST ECONOMY IS NOW PREVAILING BOTH AT HOME AND ABROAD”

PRESIDENT XI JINPING, opening the 3rd Plenum, November 2013

“The good meat is all gone; all that is left are hard bones to chew.”

PREMIER LI KEQIANG, in his Work Report to the National People’s Congress, March 2015

“China’s economic growth model remains inefficient; our capacity for innovation is insufficient; overcapacity is a pronounced problem and the foundation of agriculture is weak. Growth in investment is sluggish; the number of new areas of strong consumer activity is limited; there is no sign the international market is about to significantly pick up; maintaining stable growth is becoming more difficult.”
CHINA’S LENDING BUBBLE IS NOW BEING BROUGHT UNDER CONTROL

CONTINUED DECLINE IN CHEMICAL INDUSTRY OPERATING RATES IS WARNING SIGN FOR 2016 OUTLOOK
CHINA’S NEW 5-YEAR PLAN FOCUSES ON INCREASING SELF-SUFFICIENCY AND ENVIRONMENTAL IMPACT

The key development areas

- Oil refining, olefins, aromatics, organic raw materials

The 13th 5-year plan will promote petrochemical chemical industry from two aspects of product structure upgrade, one is to improve its self-sufficiency rate of chemical new materials and other high-end products. 2 it is to improve the quality of chemical products, especially to speed up the people’s livelihood to upgrade the influence of chemical products to achieve environmental protection, make the development of petrochemical chemical industry not only from the perspective of economic but also benefit the livelihood of the people from the Angle of environmental protection.

CHINA’S C3 IMPORTS WILL DISAPPEAR, AND ITS C2 IMPORTS STABILISE, AS IT MOVES TO SELF-SUFFICIENCY
“China’s PE spot import prices dropped in the week, especially for HDPE injection grade. Local traders lamented that some garbage and tray factories replaced HDPE injection resins with PP copolymer resins due to lower feedstock costs. Hence, the HDPE injection grade prices dropped by about $50/tonne from the previous week”. ICIS PRICING, 13 November

LOSS OF PRICING POWER DUE TO DEFLATION WILL LEAD TO RISE OF “ZOMBIE COMPANIES”
AGENDA

- The first webinar in October 2009
- Update on the US$ and oil markets
- China’s new 5-Year Plan for 2016 – 2020

CLIMATE CHANGE WILL NEED MAJOR NEW INNOVATION – AT LOW COST

The most promising opportunities for reducing carbon emissions according to 282 US Mayors...
LIFE EXPECTANCY AND GDP/CAPITA WERE VIRTUALLY UNCHANGED UNTIL 1700

**Western Life Expectancy vs GDP/Capita 1000 - 1700**

- Life expectancy
- GDP/capita

Source: P. Reifert, Angus Maddison, OECD

LIFE EXPECTANCY SUDDENLY BEGAN TO INCREASE IN THE 1700s, AND GDP/CAPITA FOLLOWED

*Longer lives allowed adults to learn from experience, and children to be educated*

**Western Life Expectancy vs GDP/Capita 1000 - 2010**

- Life expectancy
- GDP/capita

Source: P. Reifert, Angus Maddison, OECD
ECONOMIC GROWTH TOOK OFF ONCE SMALLPOX VACCINATION WAS INVENTED

“60 people in every 100 have the smallpox...and 20 die of it, in the most favourable season of life.” Voltaire, Letter on Inoculation, 1733

VACCINATION, DISINFECTION, PHARMA AND NOW HEALTHY LIFESTYLES HAVE CHANGED THE WORLD
1bn PEOPLE ARE JOINING THE NEW OLD 55+ BETWEEN 2000 - 2030

NEW OLD 55+ POPULATION BY MAJOR CONTINENT

2030, 1.8bn
+1bn
22%

1950, 250m
11%

2000, 800m
+550m
13%

N AMERICA
LATIN AMERICA
EUROPE
ASIA
AFRICA

1bn
2000
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030

MILLIONS

SOURCE: pH Report, UN Population Division

THE 55+ GENERATION IS NOW THE MAIN GROWTH COHORT – NEW PRODUCTS/SERVICES ARE REQUIRED

GLOBAL POPULATION SEGMENTS

22%
13%
39%

39%

39%

39%

39%

39%

53%

48%

36%

11%

MILLIONS & %, 1950 - 2030 (F)


SOURCE: pH Report, UN Population Division

CREATIVE ENERGY FOR IMPORTANT ISSUES
Disclaimer

Strictly Private & Confidential
This Research Note has been prepared by IeC for general circulation at the ACS webinar on 3 December 2015. The information contained in this Research Note may be retained. It has not been prepared for the benefit of any particular company or client and may not be relied upon by any company or client or other third party. IeC do not give investment advice and are not regulated under the UK Financial Services Act. If, notwithstanding the foregoing, this Research Note is relied upon by any person, IeC does not accept, and disclaims, all liability for loss and damage suffered as a result.

© International eChem 2015. All rights reserved

ACS Webinars

“Chemistry & the Economy: Global Outlook 2016”

David Harwell
Asst. Director of Industry Member Programs, ACS

Paul Hodges
Chairman, International eChem

Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact ACS Webinars at acswebinars@acs.org
Upcoming ACS Webinars
www.acs.org/acswebinars

Thursday, December 10, 2015
“Outsmarting the Shortage: The Emergence of Base Metal Catalysis in Pharma”

J. Chris McWilliams, Director of Process Chemistry, Pfizer
David Constable, Director of ACS Green Chemistry Institute, ACS
Joseph Fortunak, Professor of Chemistry, Howard University

While you are enjoying your holidays, discover the ACS Webinars Archive!
Learn from the best and brightest minds in chemistry.
Hundreds of webinars presented by subject matter experts in the chemical enterprise. LIVE every Thursday at 2pm ET!

We have a topic of interest for every chemist. Go ahead, dive into these diverse categories and discover our growing archive of past webinars.

www.acs.org/acswebinars

ACS Webinars

“Chemistry & the Economy: Global Outlook 2016”

Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact ACS Webinars at acswebinars@acs.org
How has ACS Webinars® benefited you?

“I enjoy the range of topics covered in ACS Webinars. They make for a fun Thursday afternoon enrichment activity. Thank you for organizing these presentations and to everyone who is so happy to share their research!”

Fan of the Week
Amy Goshe,
Assistant Scientific Information Specialist,
Chemical Abstracts Service

Be a featured fan on an upcoming webinar! Write to us @ acswininars@acs.org

facebook.com/acswebinars
@acswebinars
youtube.com/acswebinars

Search for “acswebinars” and connect!
Benefits of ACS Membership

Chemical & Engineering News (C&EN)
The preeminent weekly news source.

NEW! Free Access to ACS Presentations on Demand®
ACS Member only access to over 1,000 presentation recordings from recent ACS meetings and select events.

NEW! ACS Career Navigator
Your source for leadership development, professional education, career services, and much more.

www.acs.org/2joinACS

ACS Webinars® does not endorse any products or services. The views expressed in this presentation are those of the presenter and do not necessarily reflect the views or policies of the American Chemical Society.

Contact ACS Webinars ® at acswebinars@acs.org
Upcoming ACS Webinars®

www.acs.org/acswebinars

Thursday, December 10, 2015

“Outsmarting the Shortage: The Emergence of Base Metal Catalysis in Pharma”

J. Chris McWilliams, Director of Process Chemistry, Pfizer
David Constable, Director of ACS Green Chemistry Institute, ACS
Joseph Fortunak, Professor of Chemistry, Howard University

While you are enjoying your holidays, discover the ACS Webinars Archive!

Learn from the best and brightest minds in chemistry.

Hundreds of webinars presented by subject matter experts in the chemical enterprise. LIVE every Thursday at 2pm ET!

We have a topic of interest for every chemist. Go ahead, dive into these diverse categories and discover our growing archive of past webinars.

www.acs.org/acswebinars