



**The great
global energy
transition**

**...a status
report from
the front lines**

**Jeremy
Leggett**

A glowing crystal ball on a stand, with the text "The Top Ten Stories" centered inside. The background is dark blue with a light blue glow around the crystal ball.

**The Top
Ten
Stories**


A woman in a bright red jacket stands in a lush green field, gesturing with her arms outstretched towards a man in a dark suit who is sitting on a wooden bench with his back to the camera. The background features a dense forest of green trees and majestic mountains with patches of snow under a cloudy sky. A teal circle containing the number '1' is positioned in the upper right corner of the image.

1

Policymakers getting serious about climate change

25th Jun
2013

President Obama identifies climate change as his legacy issue in a speech at Georgetown University

A close-up photograph of President Barack Obama. He is looking down with a somber expression, his right hand is pressed against his face, with fingers spread. He is wearing a white dress shirt and a dark tie. The background is dark and out of focus.

“I refuse to condemn your generation and future generations to a planet that’s beyond fixing.”

9th Jun
2015

Obama, Merkel & Hollande push for a strong goal in the Paris Agreement

FINANCIAL TIMES
TUESDAY 9 JUNE 2015 WORLD BUSINESS NEWSPAPER UK £2.50 Channel Islands £2.80; Republic of Ireland €3.00

Tiger Mums tamed
China's rethink on the school curriculum — NOTEBOOK, PAGE 12

Why is Isis winning?
How coalition air strikes have failed to deter the jihadis — BIG READ, PAGE 11

Wired workers
Using wearable gadgets to keep tabs on staff — PAGE 14

G7 in historic accord to phase out fossil fuel emissions this century

◆ \$100bn pledge to poor countries reaffirmed ◆ Huge challenge for energy companies

PILITA CLARK — LONDON
STEFAN WAGSTYL — KRÜN

The Group of Seven industrial powers has agreed that the world should phase out fossil fuel emissions this century, in a move hailed as a historic decision in the fight against climate change.

G7 leaders meeting in Bavaria, Germany, said that in line with scientific findings, "deep cuts in global greenhouse gas emissions are required with a decarbonisation of the global economy over the course of this century".

The leaders of the US, Germany, France, the UK, Japan, Canada and Italy said they supported cutting greenhouse gases by 40-70 per cent by 2050 from 2010 levels — the first time they have backed such a precise long-term target.

Angela Merkel, the German chancellor, said that the cuts would have to be at the upper end of this target because "40 per cent is clearly not enough".

The leaders also reaffirmed a pledge to mobilise \$100bn a year from public and private sources by 2020 to help poorer nations tackle climate change.

Climate campaigners said the decisions taken by the wealthiest democra-

Briefing

- **Cameron's return on 'Brexit' vote**
David Cameron has retracted a threat to ministers that they would have to quit if they wanted to campaign to leave the EU, scuppering an apparent bid to force discipline on Tory eurosceptics. — PAGE 3; EDITORIAL COMMENT, PAGE 12; GIDEON RACHMAN, PAGE 13
- **Apple launches music streaming service**
Apple has made its biggest push into digital music since it began selling downloads on iTunes 12 years ago, launching a streaming service that will compete with the likes of Spotify. — PAGE 17
- **Ex-Centrica chief to lead oil and gas push**
Former Centrica chief Sam Laidlaw is to take the helm of a private equity push into oil and gas that is backed by Carlyle and CVC Capital Partners and is to spend up to \$5bn. — PAGE 17; LOMBARD, PAGE 22; NORTH SEA DEALS, PAGE 23
- **Relief as Tories shelve paid leave drive**
The prime minister's plans to revive his push to give bigger companies' employees three days of paid leave each year for voluntary work are being quietly axed, to the relief of some business leaders. — PAGE 2
- **Bids invited for military fire service**
Companies including Serco, Babcock and Capita have been invited to bid to run the military fire and rescue services, the latest Ministry of Defence outsourcing deal in its search for savings. — PAGE 4
- **Syngenta rejects fresh Monsanto move**
US agricultural seeds and chemicals company Monsanto's latest move in its pursuit of a "tax inversion" acquisition of Syngenta was rejected as "inadequate" by the Swiss group. — PAGE 17
- **Iceland poised for big step to recovery**

...and up to **70% cuts by 2050**, 34 years from now

12th Dec
2015

A clear signal in the Paris agreement:
decarbonisation, as soon as humanly possible



3rd Sep
2016

US and China announce they have ratified the Paris Agreement at G20 Summit





Adopted by every independent nation on the planet



2

Civil society awakening in critical mass

The UN's “groundswell”



Christiana Figueres
UNFCCC Executive Secretary

e.g. 1,000 cities
committed to 100% renewable energy



e.g. >50 corporations
committed to 100% renewable energy



The image shows five offshore wind turbines in a row, receding into the distance. They are set against a clear blue sky and a calm blue sea. The turbines are dark in color, and their three blades are clearly visible. The overall scene is serene and represents renewable energy.

e.g. Investors worth £350 billion pledged to pressure FTSE companies to go 100% renewable

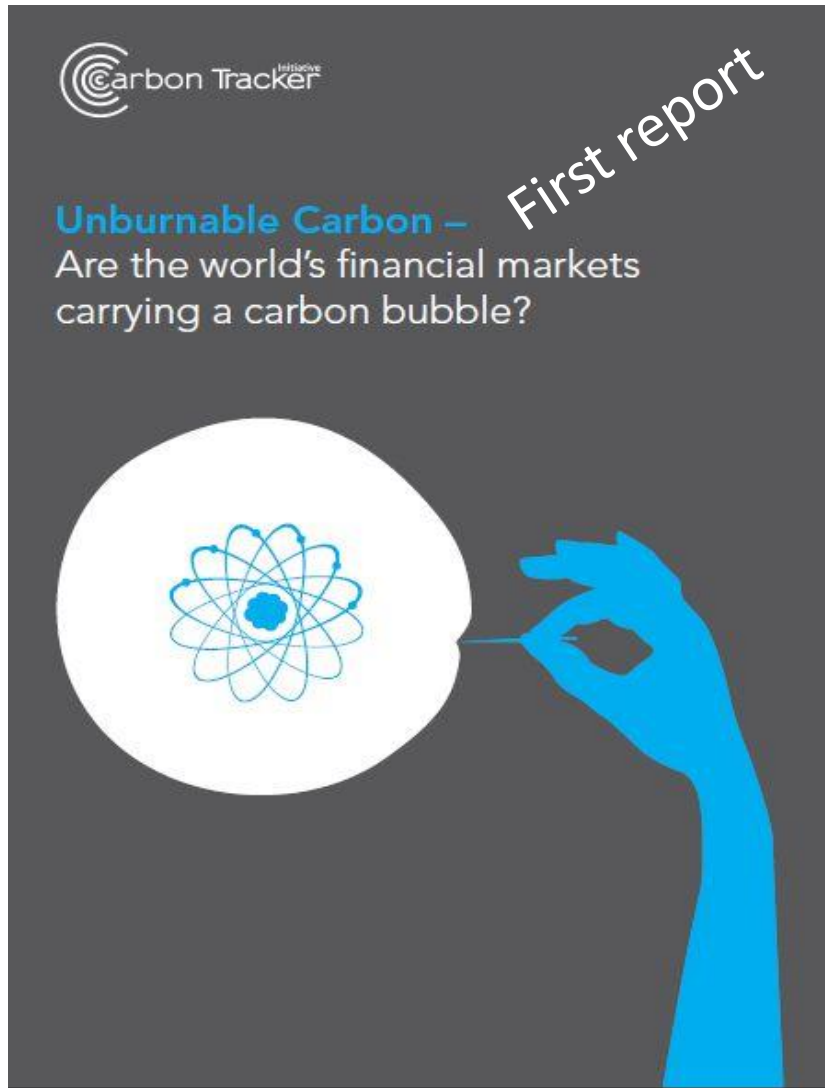


3

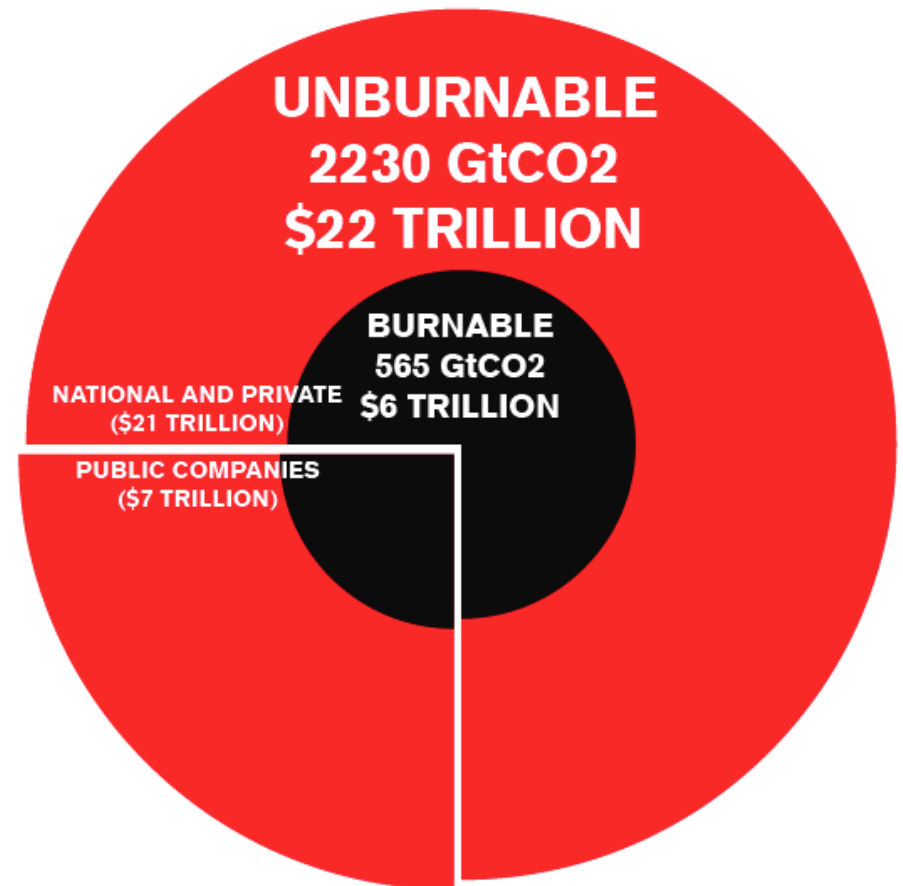
**Regulators
beginning
to regulate
climate risk**

11th Jul
2011

The “carbon bubble” of “unburnable carbon” can lead to “stranded assets”



**Proven fossil fuel reserves:
2,795 GtCO₂ \$28 trillion**



initially the Bank of
England rejected this

but...



13th Sep
2015

Bank of England speaks out on climate risk to capital markets and stranded assets

“Climate change is the biggest issue for the future”

*Stranded assets:
“..investors must be given the data to “invest accordingly”*

Mark Carney
Governor

4th Dec
2015

Launch of G20 Financial Stability Board's Taskforce on Climate-Related Financial Disclosures

Michael Bloomberg
Chairman



7th Sep
2016

Suncor Energy seeks permission to abandon some oil-sands assets

THE WALL STREET JOURNAL.



TESLA

TESLA

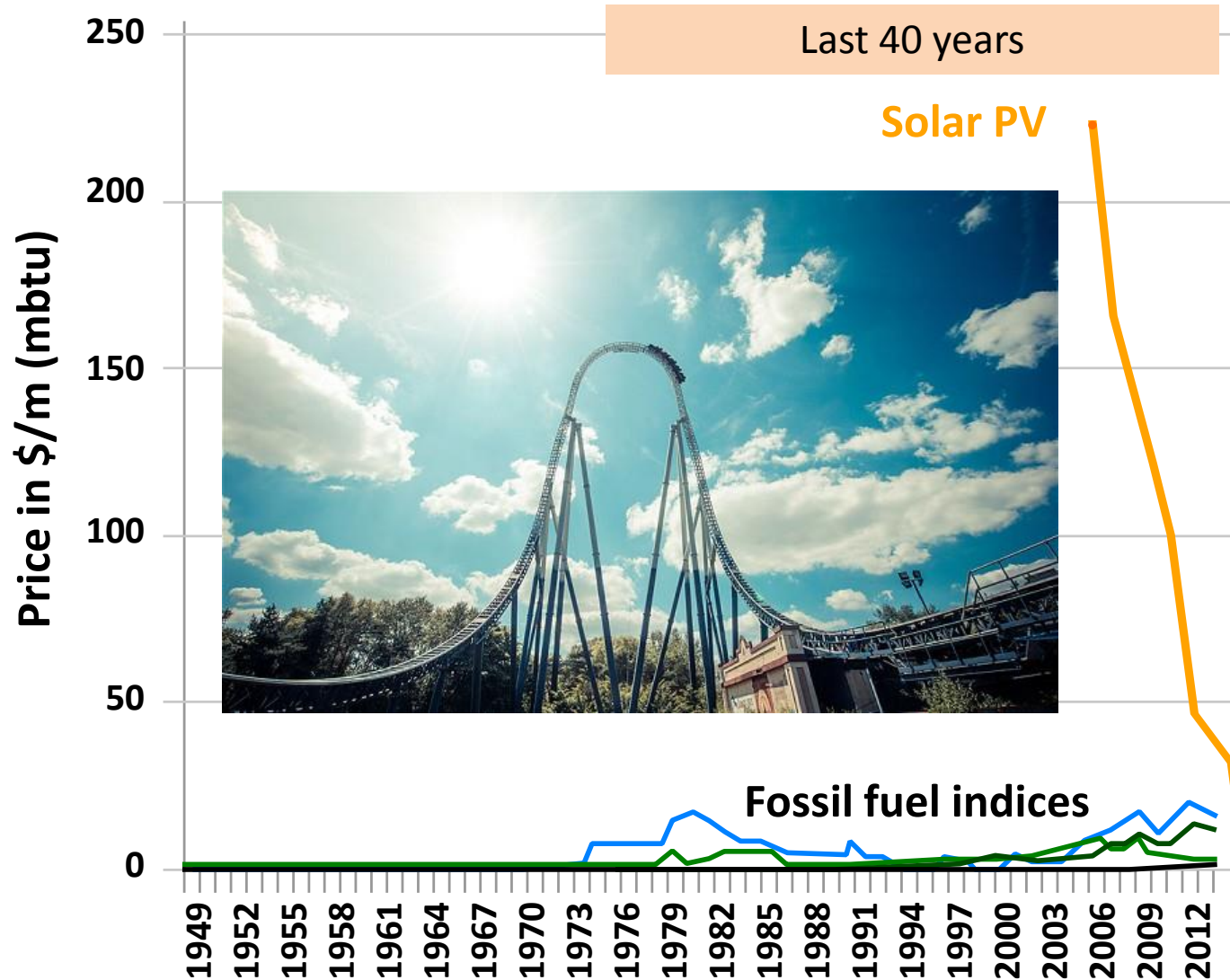
TESLA

4

Disruption moving fast

4th Apr
2014

Forty years in fossil-fuel prices the “Terrordome” since 2006



Source: Alliance Bernstein

1st May
2015

Launch of Tesla Energy



12th May
2016

Nissan announces residential battery product in Europe: September launch



6th June
2016

Nissan powers UK EV factory with solar and wind



20th July
2016

Master Plan, Part Deux: Elon Musk's latest on his vision



30 Mar
2016

Futurist Ray Kurzweil predicts solar industry dominance in 12 years



Solar doubles every 2 years

Seven doublings since 2000...

...to 2% of global electricity

...six more doublings

...to 100% of global energy

10th Aug
2016

Holy Grail of energy policy in sight as battery technology smashes the old order

The Telegraph

“This country can achieve total self-sufficiency in power at viable cost from our own sun, wind, and waters within a generation. Once we shift to electric vehicles as well, we will no longer need to import much oil either. Rejoice.”

Ambrose Evans-Pritchard

London at night

16th Jan
2016

A photograph showing Crown Prince Shaikh Mohammad Bin Zayed Al Nahyan on the left, wearing a white thobe and ghutra with gold trim, shaking hands with French President Francois Hollande on the right, who is wearing a dark blue suit and glasses. In the background, a French flag is visible, and a man in a dark uniform with a white cap is saluting.

“In 50 years, when we ship off the last barrel of petrol, we will not be sad. I promise you, my brothers and sisters, we will be celebrating.”

Crown Prince Shaikh Mohammad Bin Zayed Al Nahyan
Abu Dhabi



5

**Utilities racing to escape
a death spiral**

Until
1st Dec
2014

First major utility business model U turn



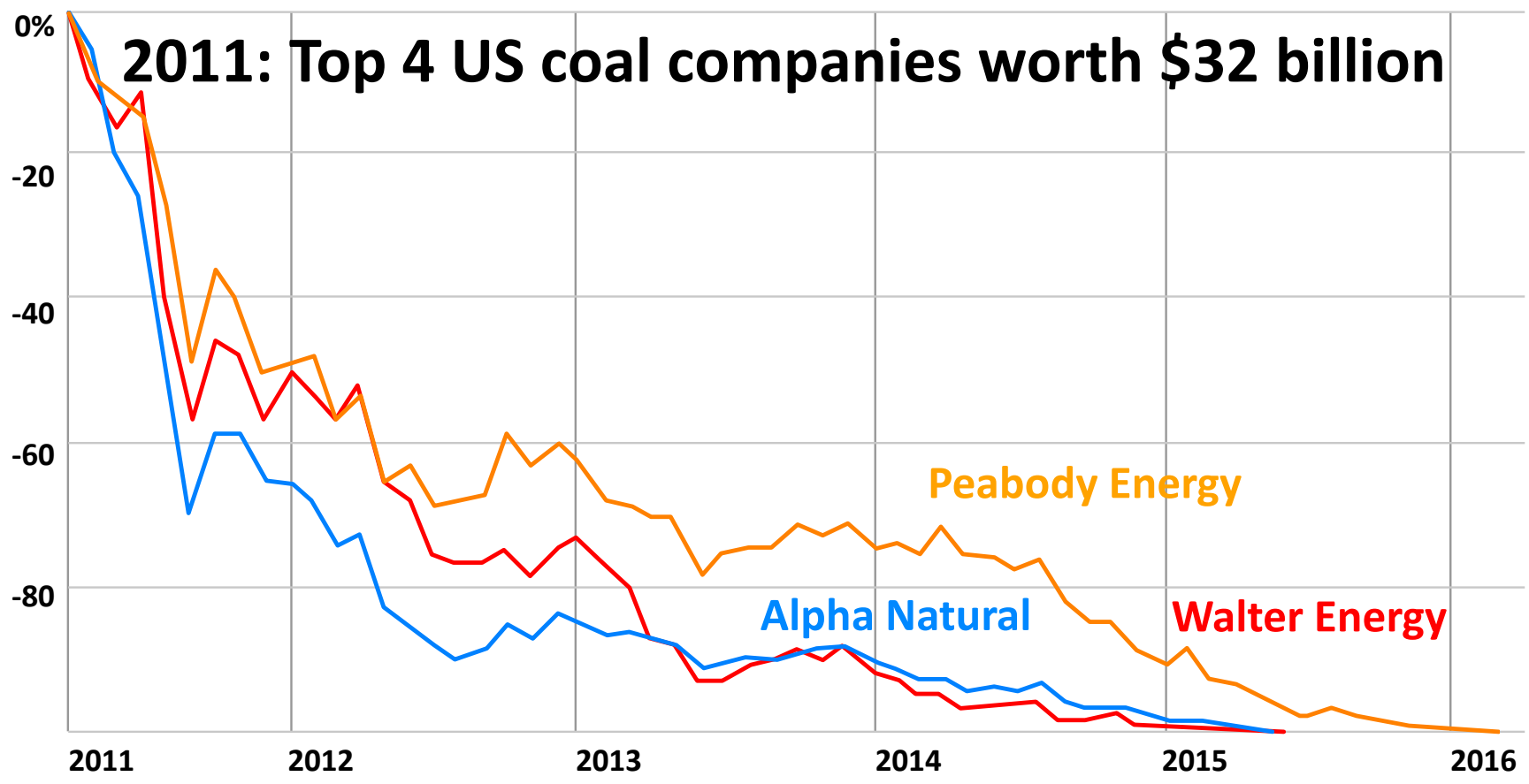
23rd Sep
2015

“Coal is in terminal decline” Goldman Sachs



13th Apr
2016

Peabody Energy, no. 1 US coal miner, goes bankrupt



2nd March: JPMorgan stops direct financing of new coal mines and new coal plants in rich nations



**Some think nuclear power
can come to the rescue**

but....

28th July
2016

EDF board votes to go ahead with Hinkley Point C

EDF Director Gerard Mangin resigns hours before board meeting



Board votes 10-7 with all union reps opposed

Hinkley Pointless

Britain should cancel its nuclear white elephant
and spend the billions on making renewables work

Meltdown

Comparable cost of electricity generation
in Britain in 2025, £/MWh


Forecasts by year: low high *Central estimate*



Source: National Audit Office

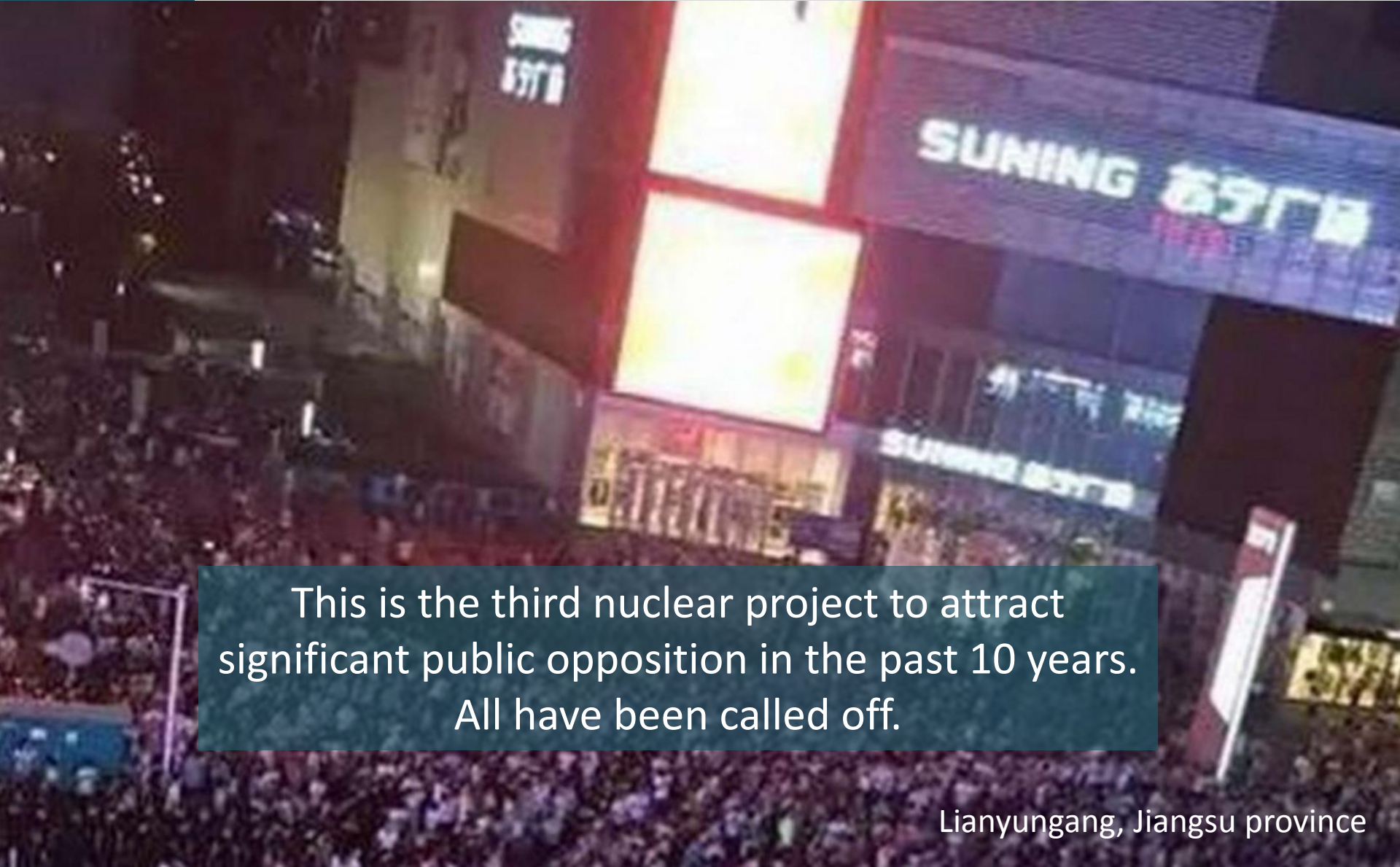
19th Aug
2016

Huge reversal in opinion on nuclear versus renewables among UK business leaders

- 
- Huge majority for new nuclear 12 months ago
 - Now only 9% “strongly agree”
 - 75% members support strong solar and wind

10th Aug
2016

Mass protest against Sino-French nuclear waste plant threatens Chinese national nuclear plans



This is the third nuclear project to attract significant public opposition in the past 10 years. All have been called off.

Lianyungang, Jiangsu province

31st Aug
2016

Chinese public overwhelmingly backs renewables push: 92% willing to pay more for green power

Equivalent polls in US and UK: 50% & 48%



A large industrial refinery at sunset. The sky is a mix of orange, yellow, and pink. The refinery is filled with tall distillation columns, pipes, and scaffolding, all illuminated by warm lights. In the background, a cable-stayed bridge with two prominent towers is visible. The overall scene conveys a sense of industrial activity during the twilight hours.

6

The oil and gas industry
entering its twilight years

27th May
2016

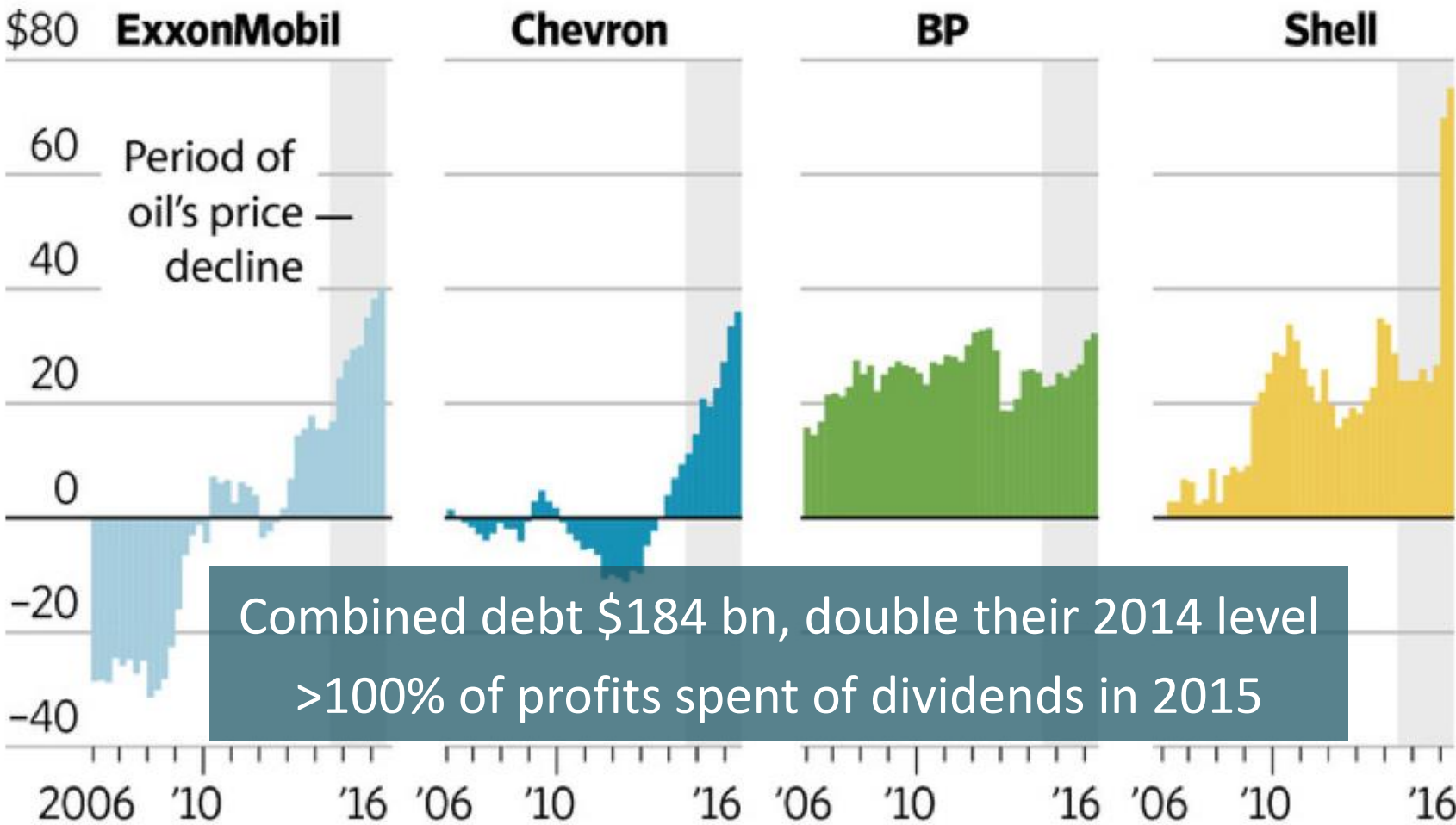
The long twilight of the big oil companies

FINANCIAL TIMES



Big oil companies binge on debt

THE WALL STREET JOURNAL.



Combined debt \$184 bn, double their 2014 level
>100% of profits spent of dividends in 2015

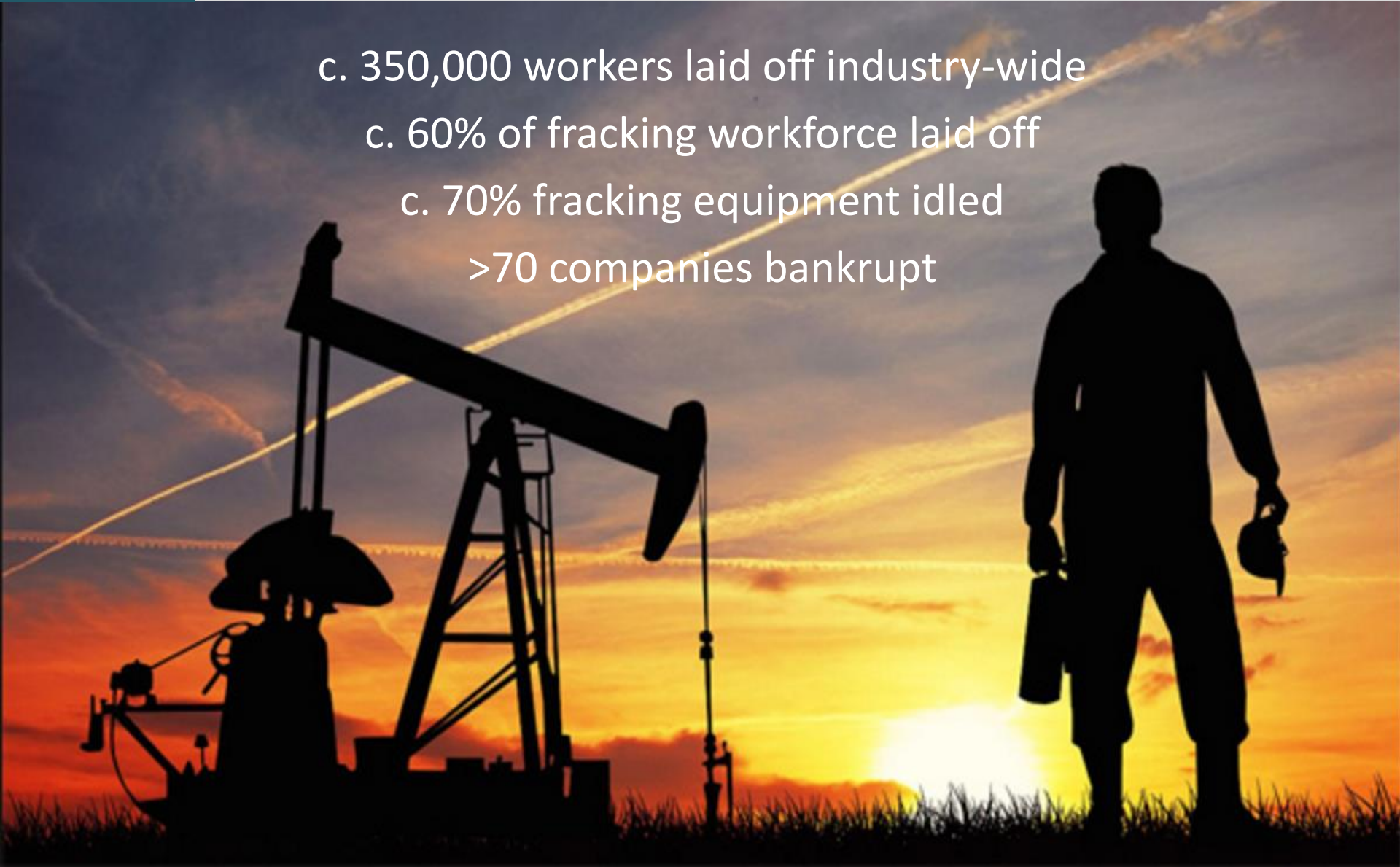
Source: Wood Mackenzie

8th July
2016

Oil industry faces huge worker shortage

OILPRICE.com

- c. 350,000 workers laid off industry-wide
- c. 60% of fracking workforce laid off
- c. 70% fracking equipment idled
- >70 companies bankrupt



15th July
2016
\$46

Major LNG projects on the rocks as competition escalates

OILPRICE^{CO}



25th July
2016
\$43

Dismal delivery puts big oil and gas energy projects at risk

FINANCIAL TIMES



Gorgon: just back online after 2 major gas leaks since 2014 start

29th July
2016
\$41

Oil giants find there's nowhere to hide from doomsday market

Bloomberg

“The industry cannot survive on current oil prices.”

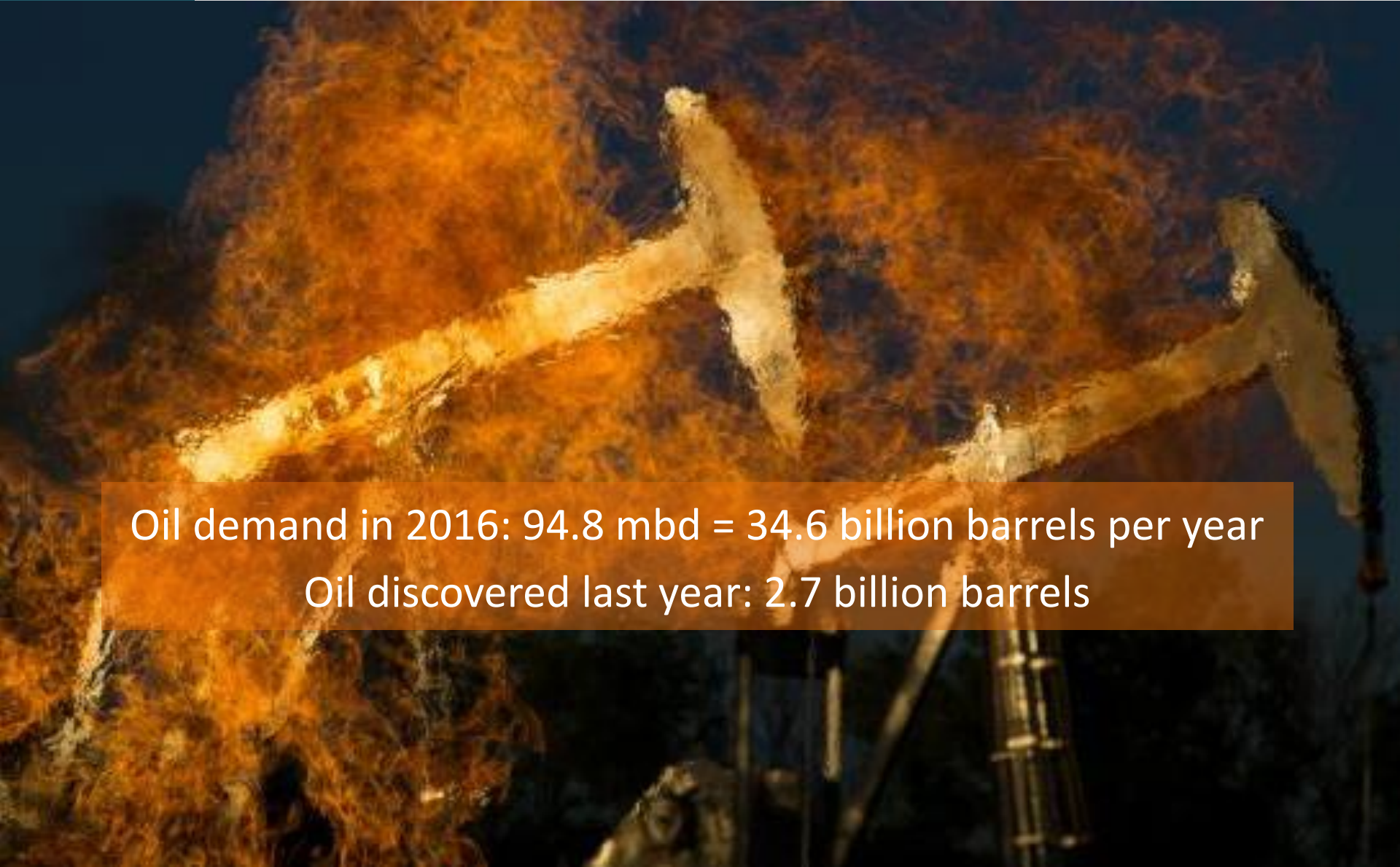
Fadel Gheit, analyst
Oppenheimer & Co



30th Aug
2016

Oil Discoveries at 70-Year Low Signal Supply Shortfall Ahead

Bloomberg



Oil demand in 2016: 94.8 mbd = 34.6 billion barrels per year
Oil discovered last year: 2.7 billion barrels

7th Sep
2016

Oil market faces supply crunch within a year, warns HSBC





7

The shale boom going bust

11th Apr

2011

\$126



Libya's Civil War

A GRAVE SCANDAL AT ARLINGTON

People Power for Palestine
BY JOE KLEIN

BATTER UP! YOUR GUIDE TO THE 2011 BASEBALL SEASON

The last great work of David Foster Wallace
BY LEV GROSSMAN

TIME

ENVIRONMENT SPECIAL

**THIS ROCK
COULD
POWER
THE
WORLD**

WHY SHALE CAN SOLVE
THE ENERGY CRISIS

BY BRYAN WALSH

A century's worth is buried in our backyards ...


... but drilling for it threatens our land

www.time.com

17th Jun
2015
\$60

The coming shale bust? IOU now well over \$200 bn

Bloomberg

An aerial photograph of a vast shale gas field. The landscape is characterized by a dense network of winding dirt roads and numerous small, circular wellheads scattered across the terrain. In the lower right quadrant, there is a larger industrial complex with several large, rectangular storage tanks and processing units. The overall scene depicts a highly developed and active energy extraction site.

The Shale Industry Could Be Swallowed By Its Own Debt

**11th Aug
2016**

Bottom feeding private equity begins to move in on distressed oil assets as bankruptcies reach 90



10th Feb
2016
\$30

It will take more than an oil rally to restart the US shale boom

*"It's not really like just turning on
the light switch."*

Bill Thomas, chief executive
EOG Resources



21st Apr
2016

As Oil Jobs Dry Up, Workers Turn to Solar Sector

THE WALL STREET JOURNAL.



Alamo 6 solar farm

2nd June
2016

Scottish parliament bans fracking



24th June
2016

Germany bans fracking after years of dispute



23rd Aug
2016

California may cap power suppliers' gas use after massive leak

Bloomberg



23rd May
2016

Fracking gets go-ahead in UK for first time since 2011



>4,000 objections
Friends of the Earth judicial review?

8th Aug
2016

UK shale: “All households near fracking sites set to get money paid straight into banks”

INSIDE: PREMIER LEAGUE SEASON GUIDE SUNDAY EXPRESS PREMIER LEAGUE GUIDE Great news for the fans of your team **8-PAGE SPORT PULLOUT**

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HOLIDAYS IN EUROPE FROM £7 SEE PAGE 57

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£10K CASH FOR HOMES HIT BY FRACKING

All households near shale gas sites set to get money paid straight into banks

By **Caroline Wheeler** POLITICAL EDITOR

HUNDREDS of thousands of people could be sitting on a goldmine thanks to Theresa May's desire to share out profits from the shale gas revolution. Under the new proposal, a percentage of profits from fracking, potentially up to £10,000, would be paid directly into the bank accounts of those living in neighbourhoods where the drilling technique is approved. As part of her stated aim to deliver an economy that works for all, the new Prime Minister's plan could see

TURN TO PAGE 2

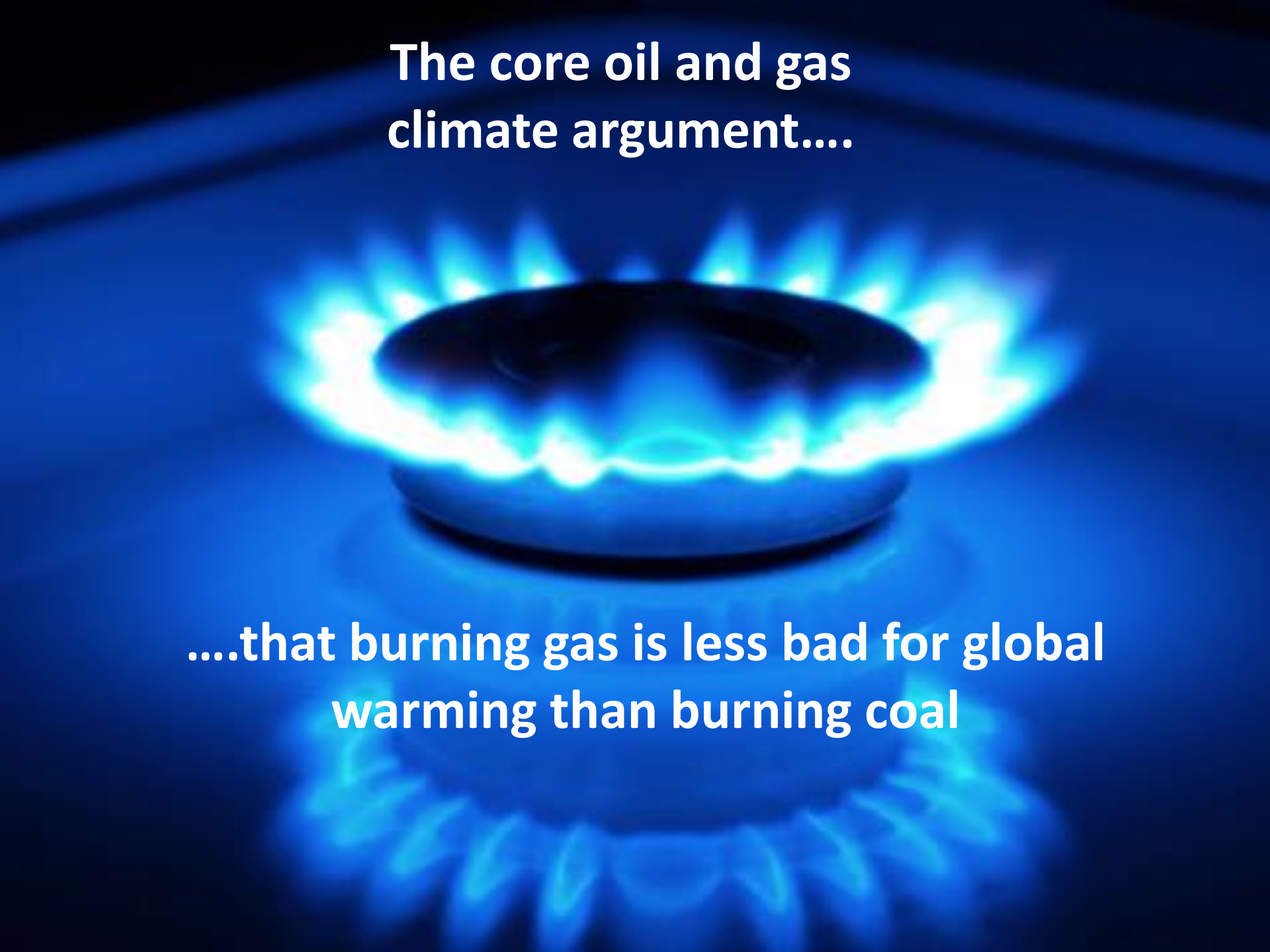


Brit's record swim
RIO OLYMPICS: PAGES 2,3,4,5 & SPORT



8

The gas bridge
unraveling

A close-up photograph of a lit gas burner. The burner is a dark, circular metal ring with a central cap. It is surrounded by a ring of bright blue and white flames. The background is dark, making the flames stand out. The text is overlaid on the image in white, bold font.

**The core oil and gas
climate argument....**

**...that burning gas is less bad for global
warming than burning coal**

True

....depending
on leakage



29th Feb
2016

EPA Chief: Methane emissions from oil and gas “substantially higher than we thought”

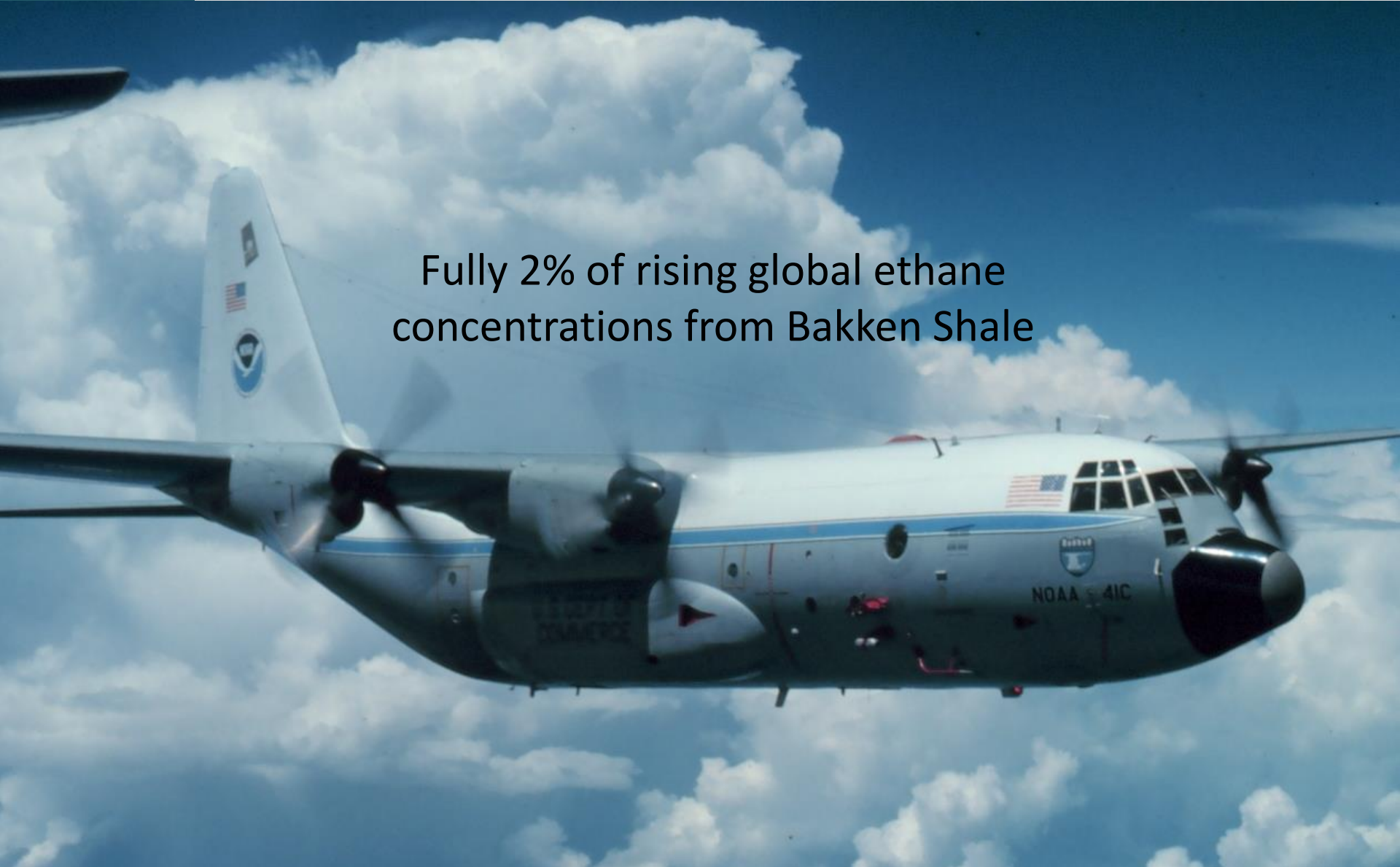


Gina McCarthy
EPA Administrator

28th Apr
2016

The U.S. oil and gas boom is having global atmospheric consequences, NOAA reports

Fully 2% of rising global ethane concentrations from Bakken Shale



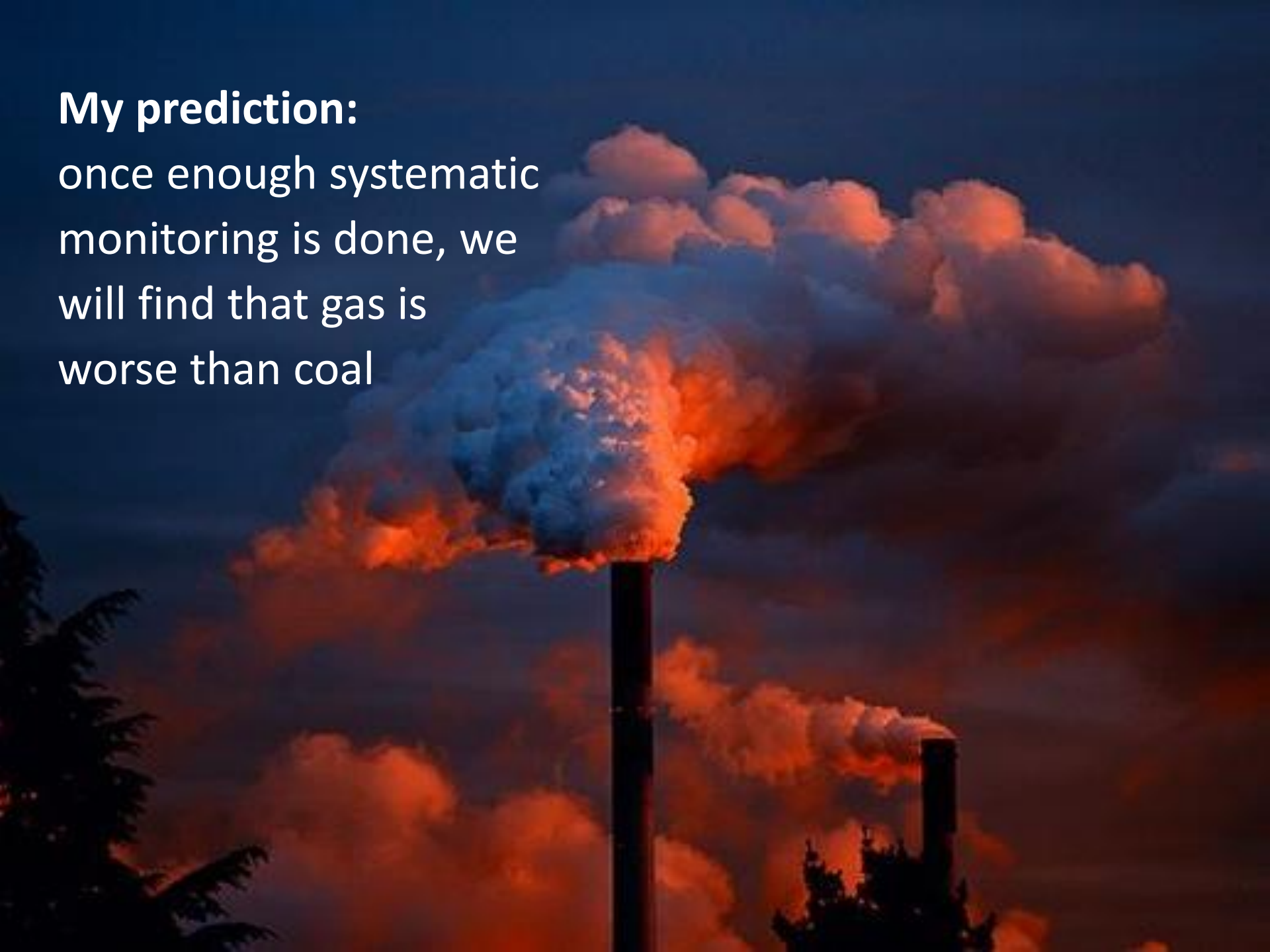
**16th Aug
2016**

In U.S. methane hot spot, researchers pinpoint sources of 250 leaks using airborne sensors



My prediction:

once enough systematic
monitoring is done, we
will find that gas is
worse than coal





9

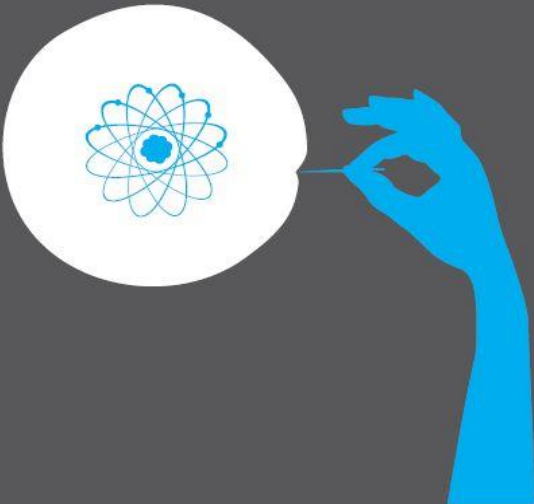
**Divestment
snowballing**

July
2012

The origin of the divestment movement



Unburnable Carbon –
Are the world's financial markets
carrying a carbon bubble?



4th Dec
2015

**>500 institutions, worth \$3.4 trillion
have divested, or pledged to**



12th Dec
2015



A movement energised...



**Carefree
retirement
ahead**

**...now increasingly
marrying the economic
case with the ethical one**

e.g....

**18th July
2016**

Swedish pension fund AP4 makes biggest divestment move of any institution to date

The \$35bn pension scheme will:

- **decarbonise its \$14.7bn global equity portfolio by 2020**
- **invest \$3.2bn in passive investment tracking low carbon benchmarks**

20th Aug
2016

£500m fund drops all oil investments seeing gloomy outlook for sector

“Even the Saudis
appear to know
the fossil fuels
game is up”



Stephen Bailey
co-manager, Liontrust Macro
Equity Income fund



10

The legal system
fast becoming a driver

16th June
2016

Volkswagen seeks redemption from fraud with EVs, robo-taxis, and a ride sharing network



Matthias Mueller, CEO

Conclusions



A photograph of a modern conference room. A long, dark, polished conference table is the central focus, with a single glass of water placed on it. The room is furnished with black leather chairs around the table. Large windows with sheer white curtains are visible in the background, allowing natural light to filter in. The ceiling has several recessed lights. The overall atmosphere is professional and clean.

**The wider spirit of the Paris Agreement
will change everything...**

**The energy-transition will accelerate
due to mutual reinforcement of
emerging megatrends**



Opportunities and threats everywhere





Those with vision who can move fast are best placed to profit / save the world



Thank you

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www.jeremyleggett.net