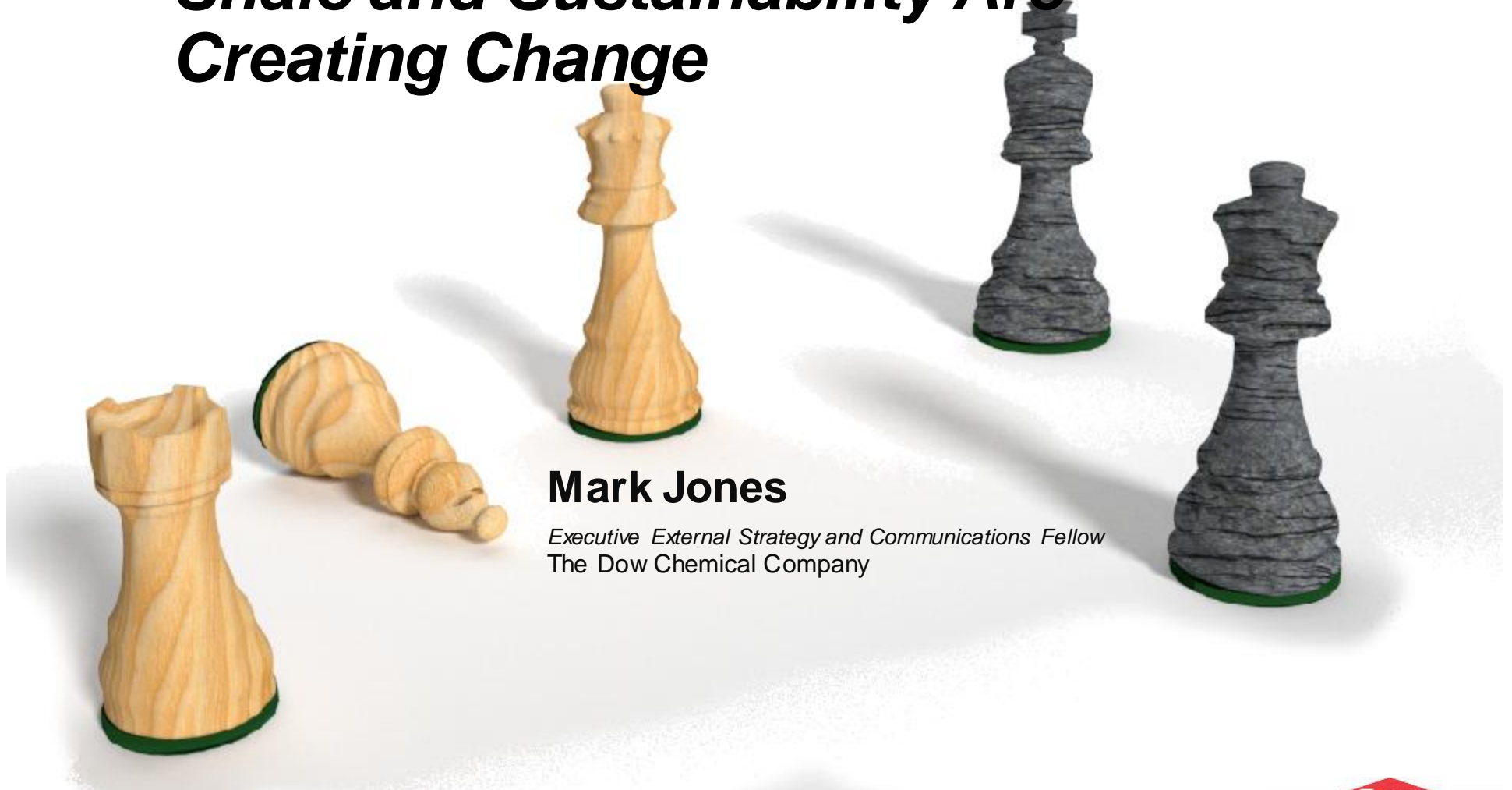


# Forces Shaping Industry: *Shale and Sustainability Are Creating Change*

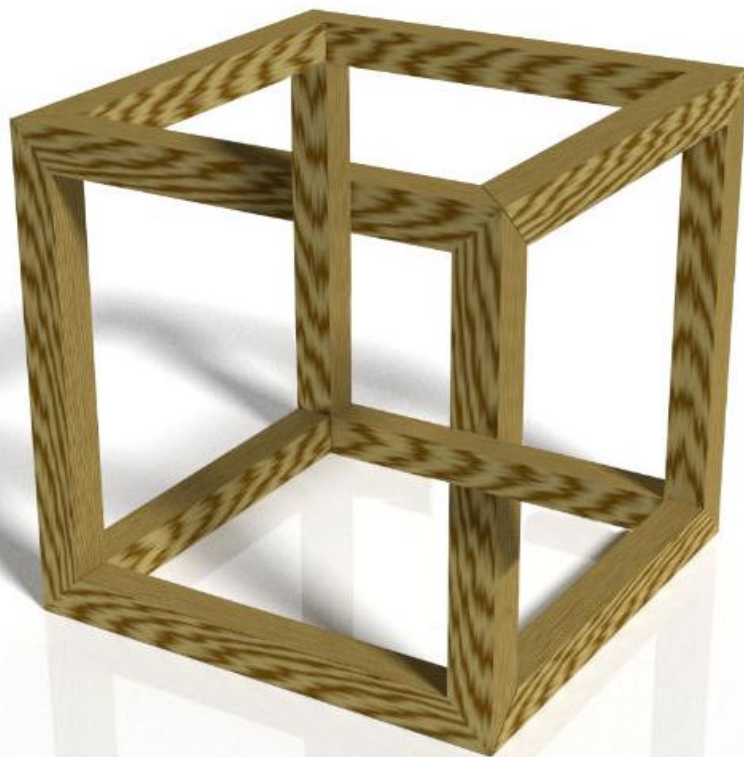


**Mark Jones**

*Executive External Strategy and Communications Fellow  
The Dow Chemical Company*



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**Energy**  
CERTIFIED

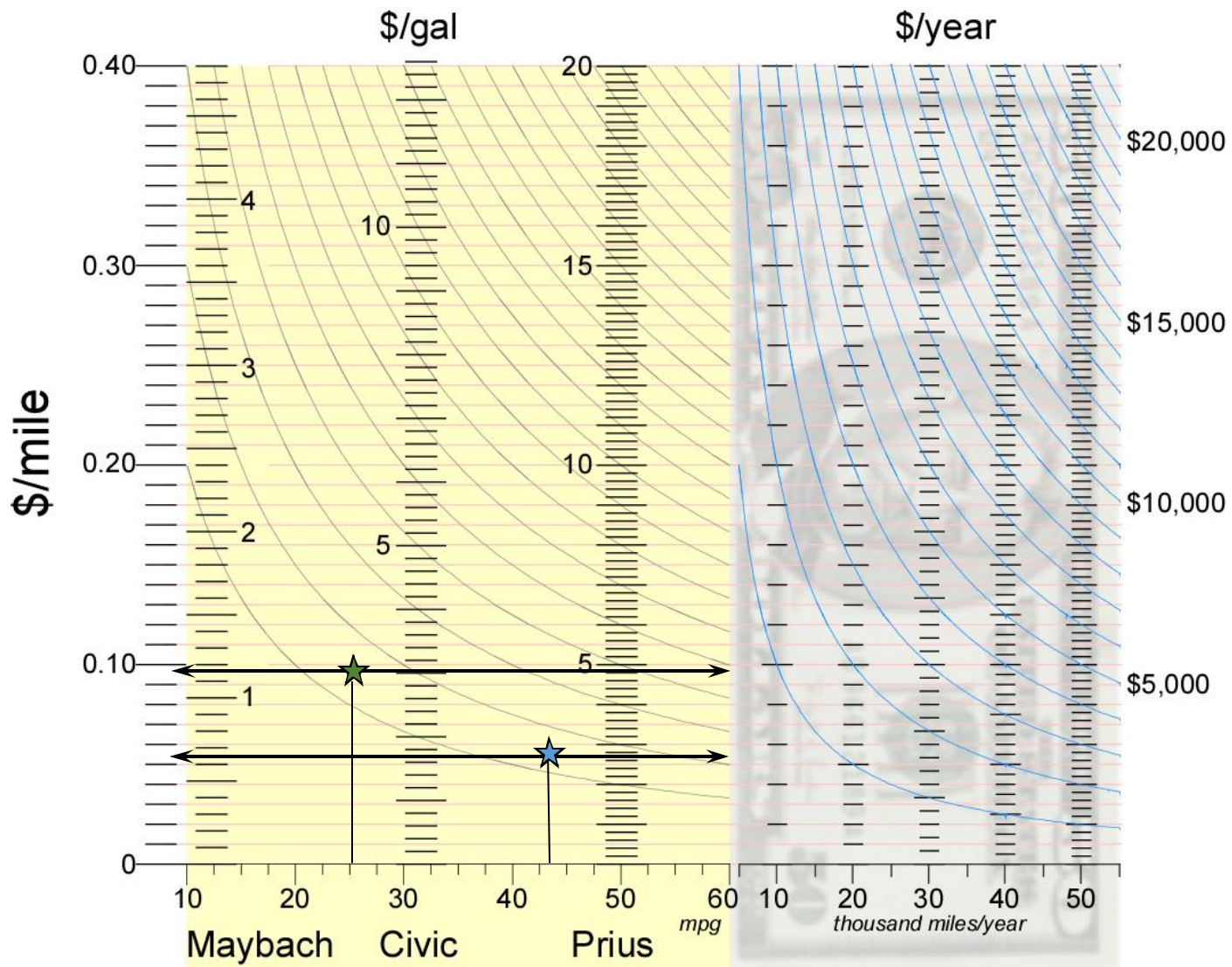


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I AM DESTROYING THE  
PLANET SLOWER  
THAN YOU ARE.

BUT NOT AS  
SLOWLY AS I  
THOUGHT



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September 15, 2017



September 15, 2017



September 15, 2017



September 15, 2017



September 15, 2017





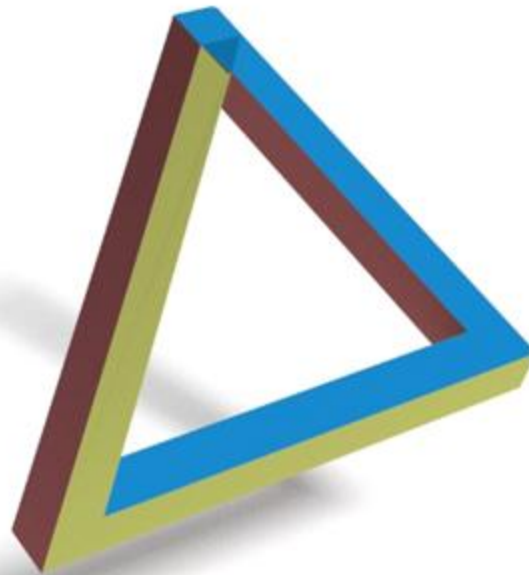
September 15, 2017



September 15, 2017

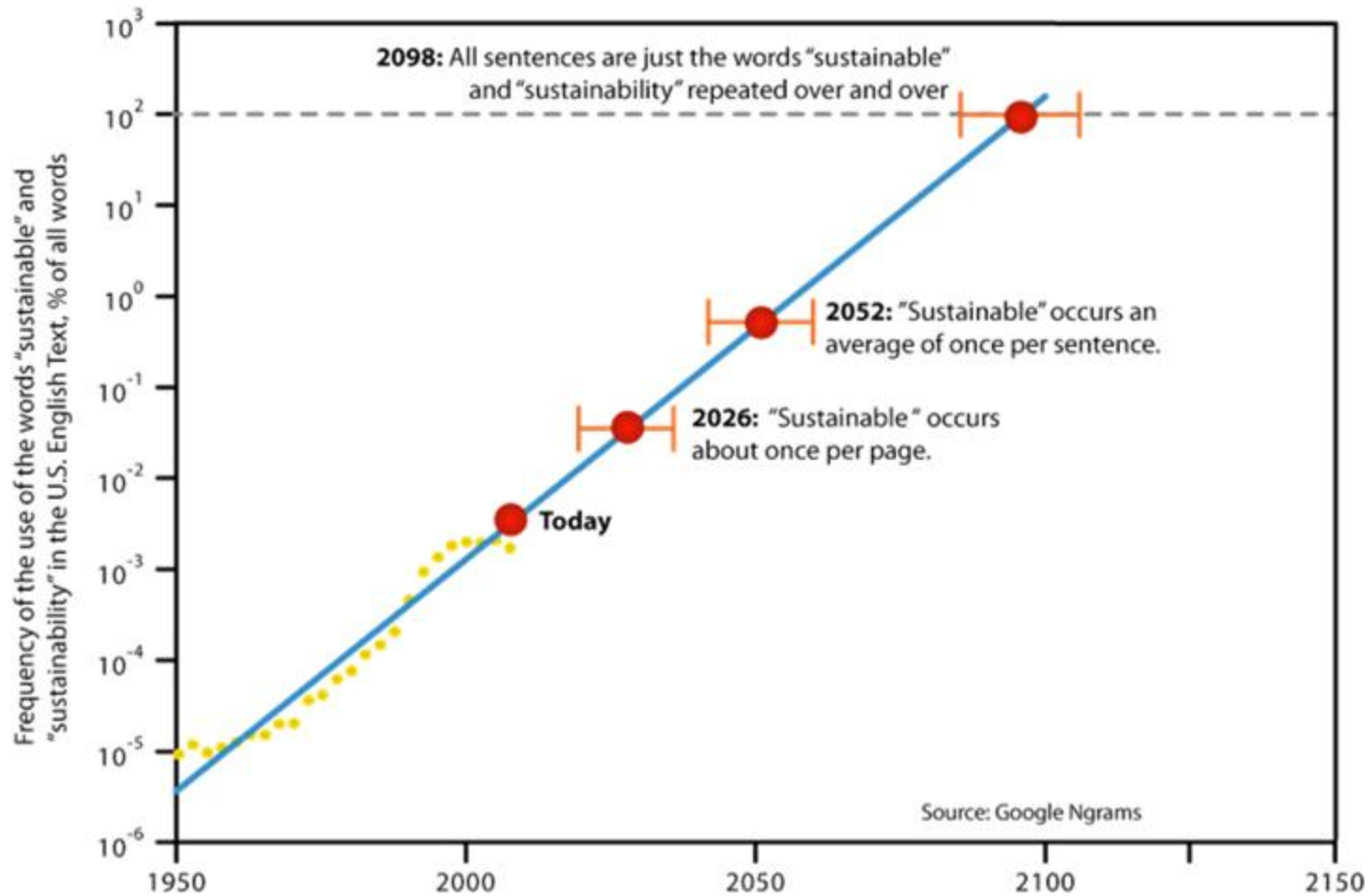


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# Sustainability is Unsustainable?



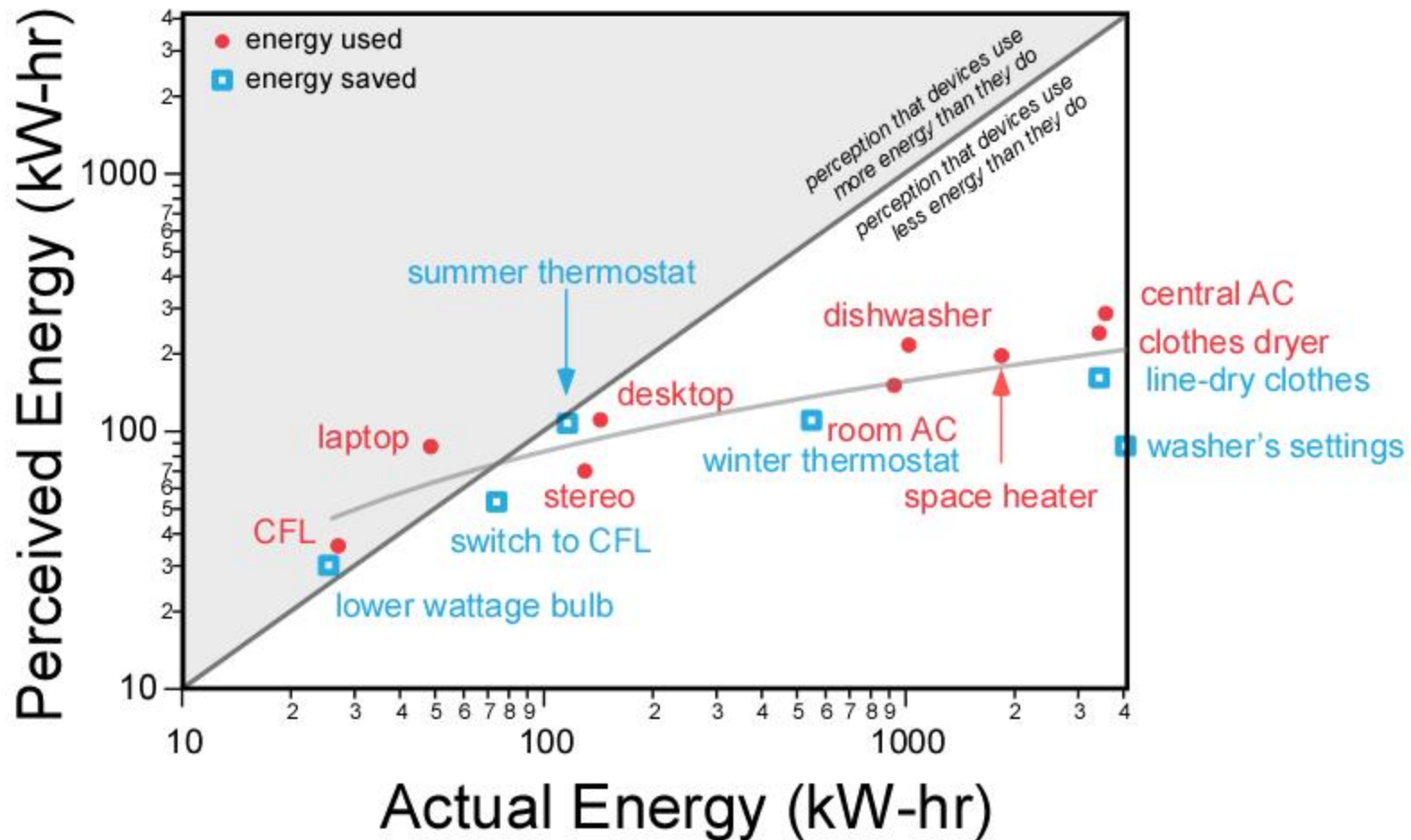
<http://imgs.xkcd.com/comics/sustainable.png>



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2

# Perception vs Reality



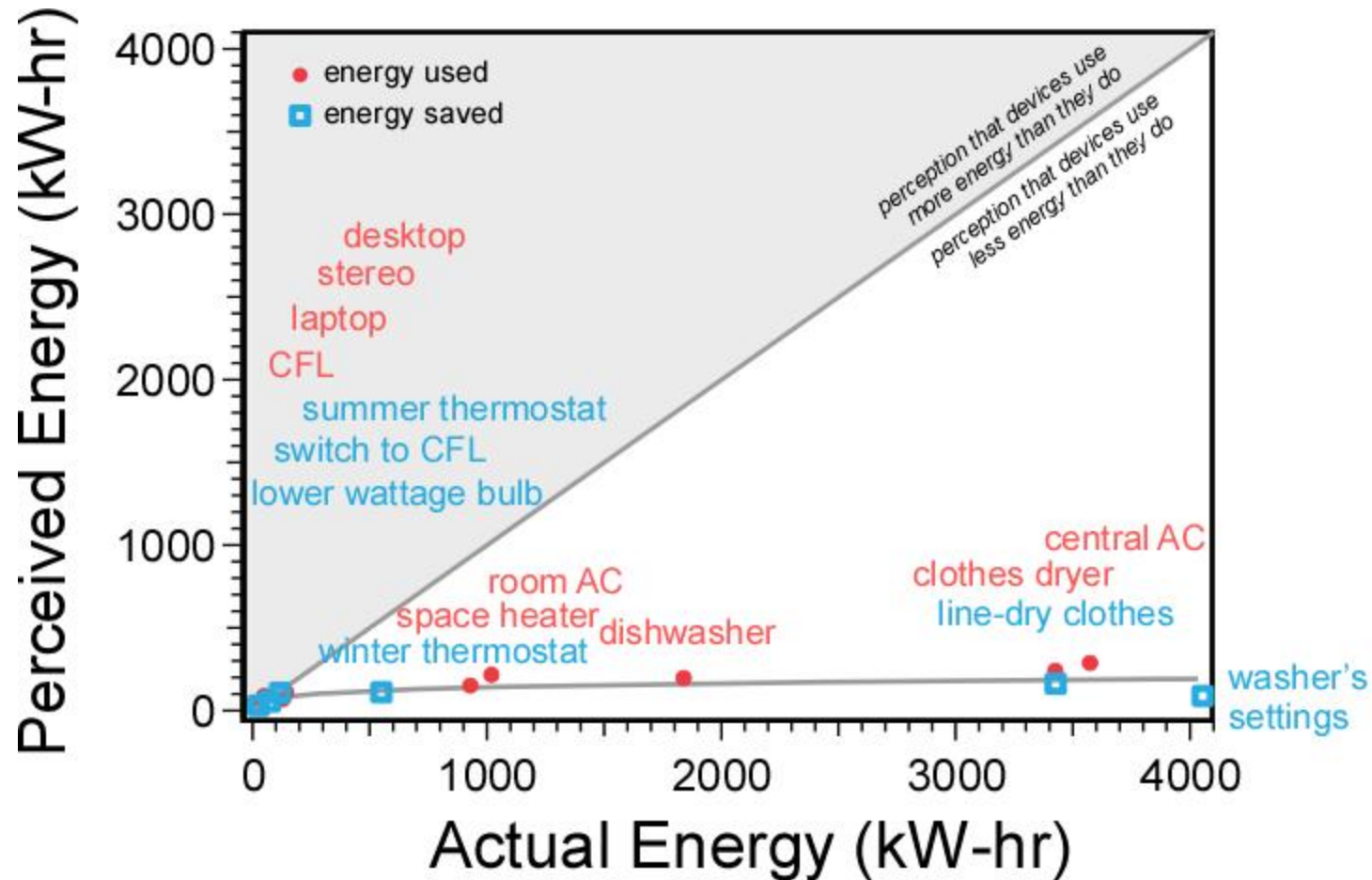
Attari, Shahzeen; DeKay, Michael L.; Davidson, Cliff I.; de Bruin, Wandi Bruine; "Public perceptions of energy consumption", PNAS, www.pnas.org/cgi/doi/10.1073/pnas.1001509107.



September 15, 2017



# Perception vs Reality



Attari, Shalvizeen; DeKay, Michael L.; Davidson, Cliff I.; de Bruin, Wandl Bruine; "Public perceptions of energy consumption", PNAS, [www.pnas.org/cgi/doi/10.1073/pnas.1001509107](http://www.pnas.org/cgi/doi/10.1073/pnas.1001509107).



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# Which is more sustainable?

*plastic*



*paper*



# Which is more sustainable?

*streaming*



*physical media*

# Which is more sustainable?

*A meat-eater in a Prius*



*A vegan in a Hummer*

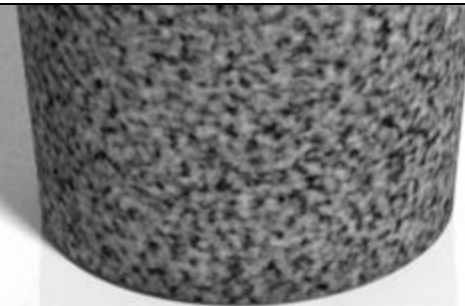


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# Is this Cup Sustainable?



*Sustainable is not an intrinsic property of a material!  
You can't know by just looking.*



*How about this one?*

# Life Cycle Assessment



adapted from [sustainable-graphic-design.blogspot.com](http://sustainable-graphic-design.blogspot.com)



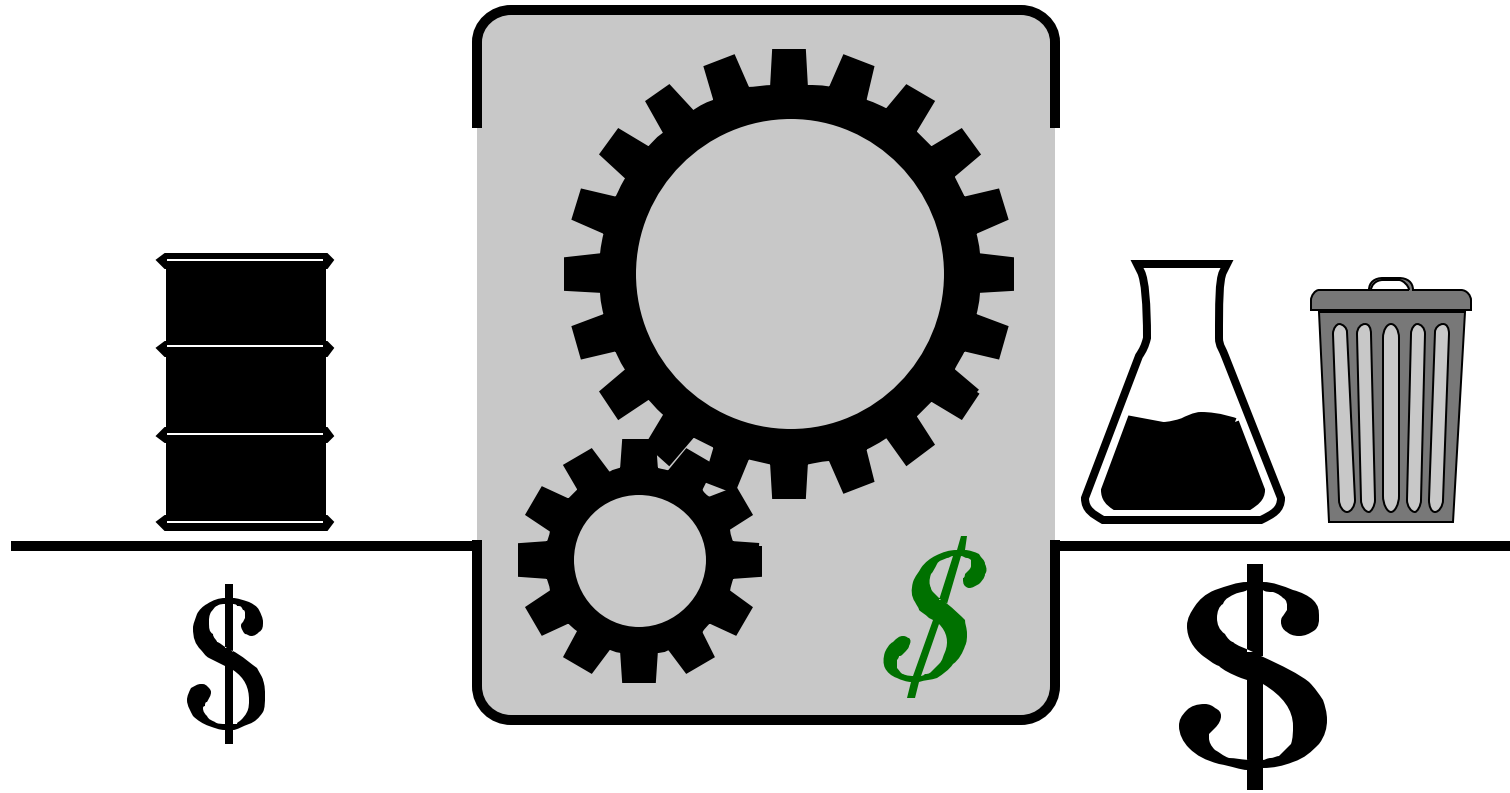
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# Signs of Hope





# Chemical Industry - *simplified*

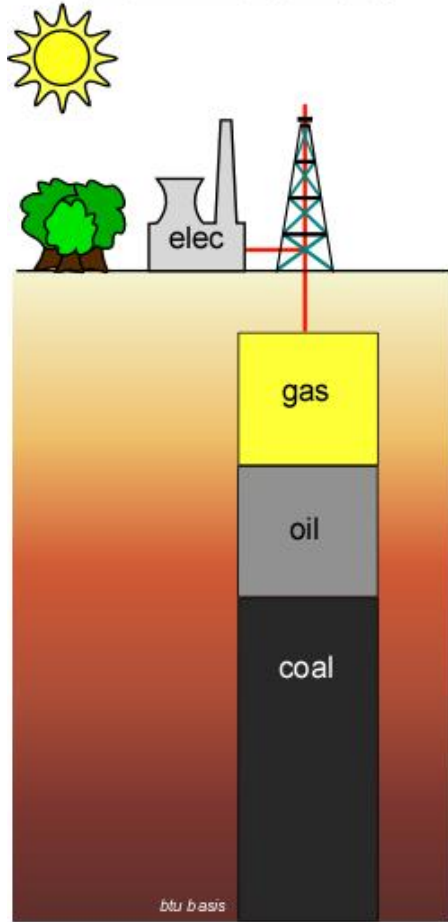


# Birth of the Modern Industry





# Raw Materials

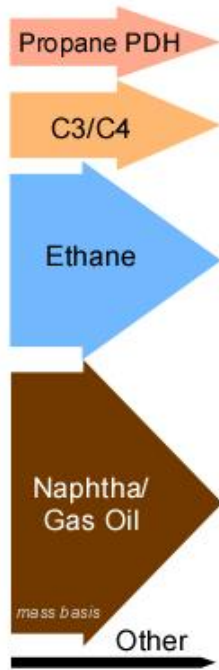


source: 2011 BP Statistical Review

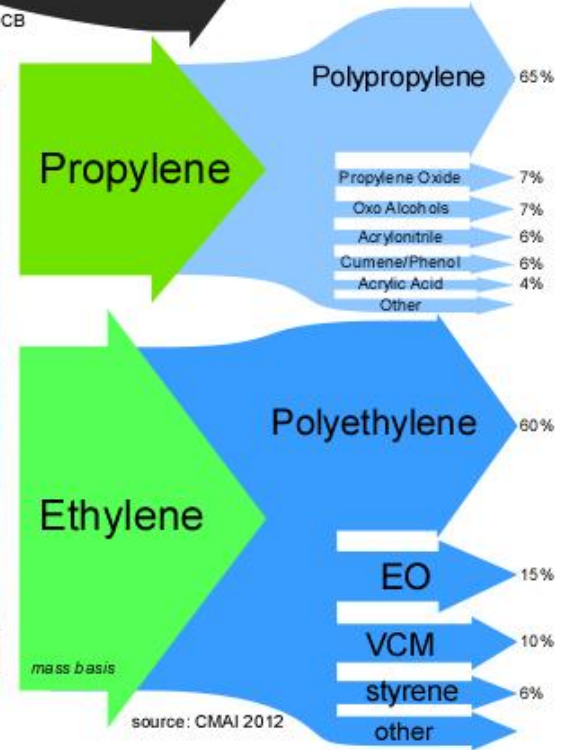
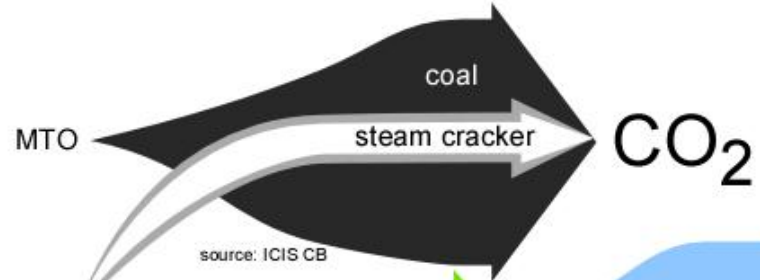
# Cracker



# Products



source: CMAI 2012



source: CMAI 2012



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# Polyolefin Growth



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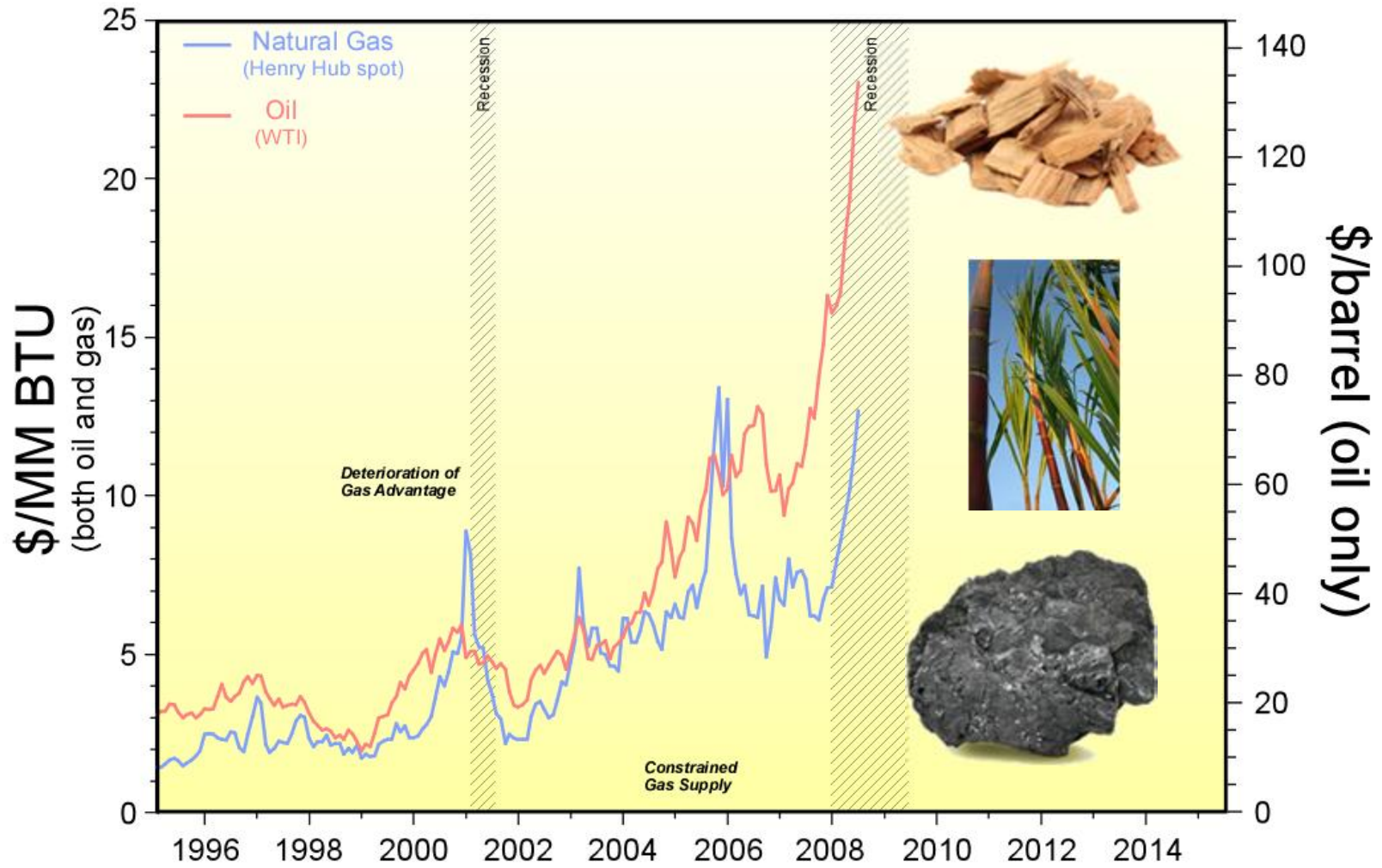
Healthy



Unhealthy



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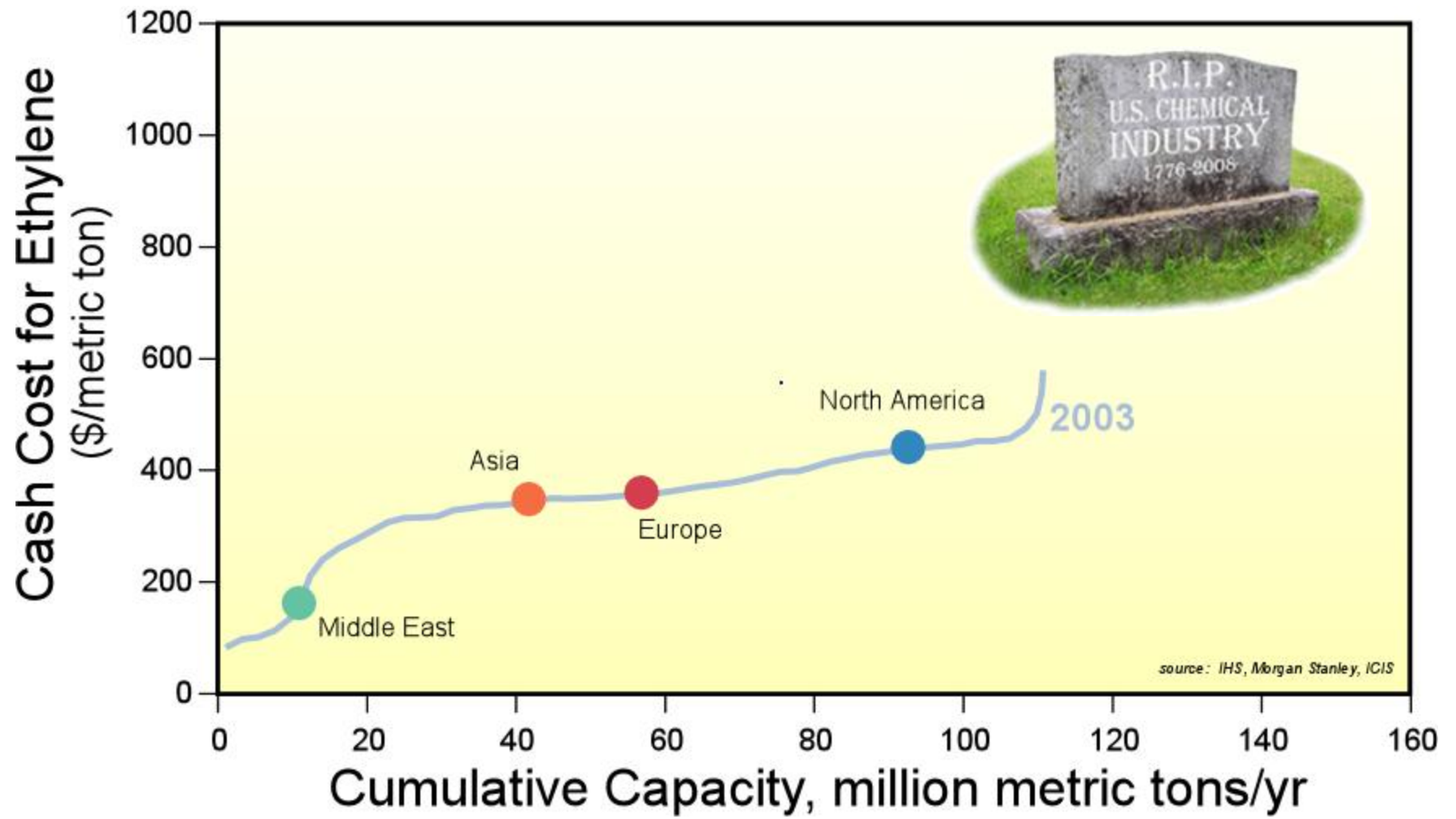


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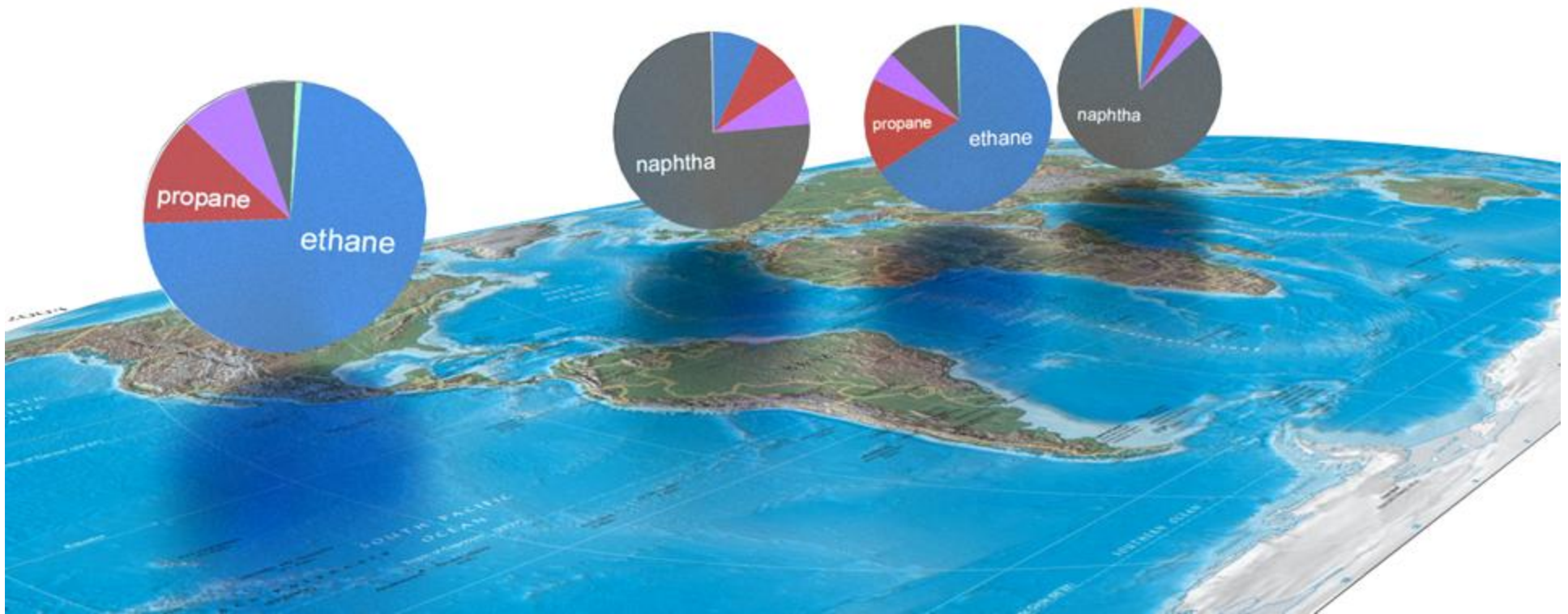


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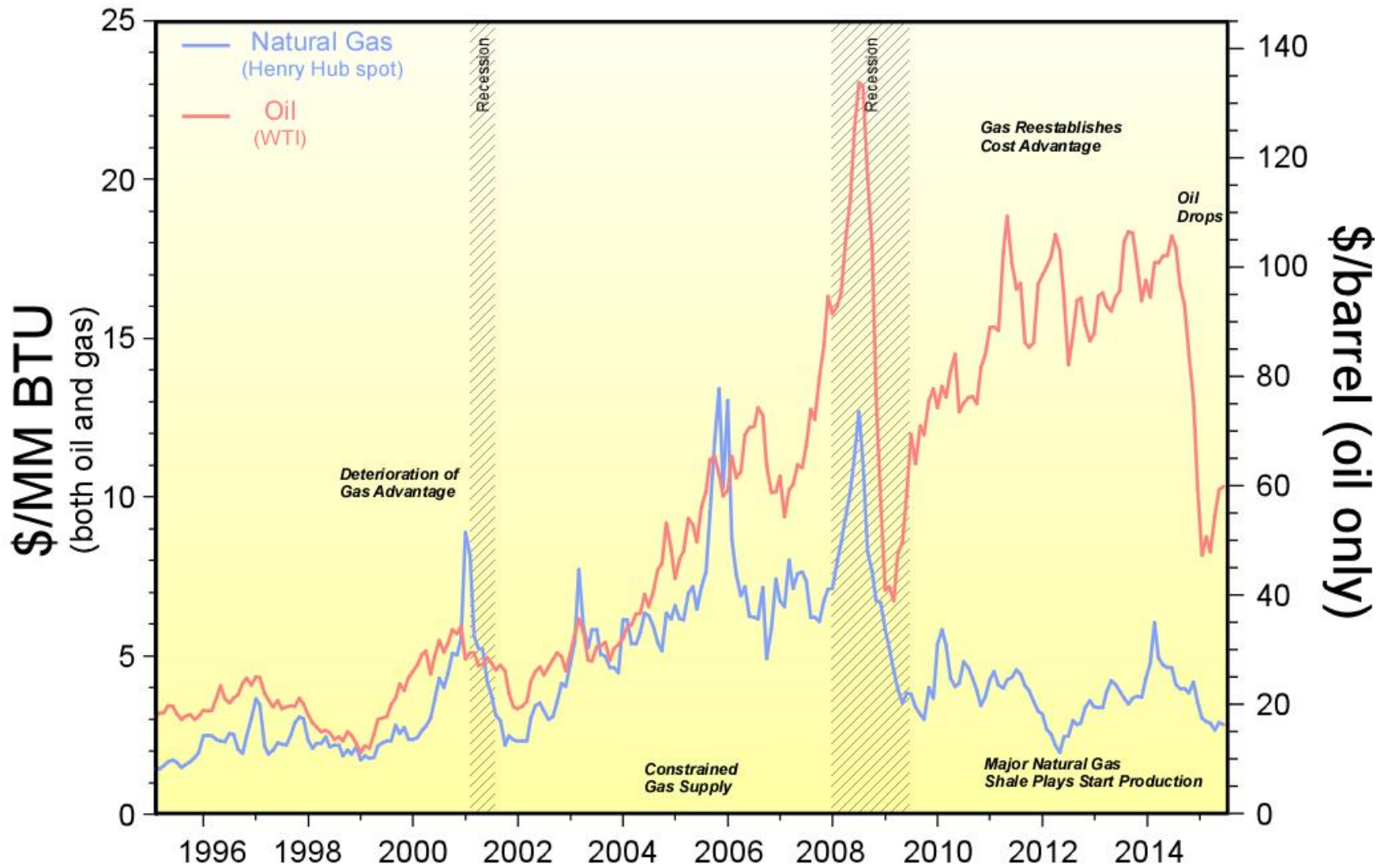
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■ ethane ■ propane ■ butane ■ naphtha ■ MTO/CTO ■ other



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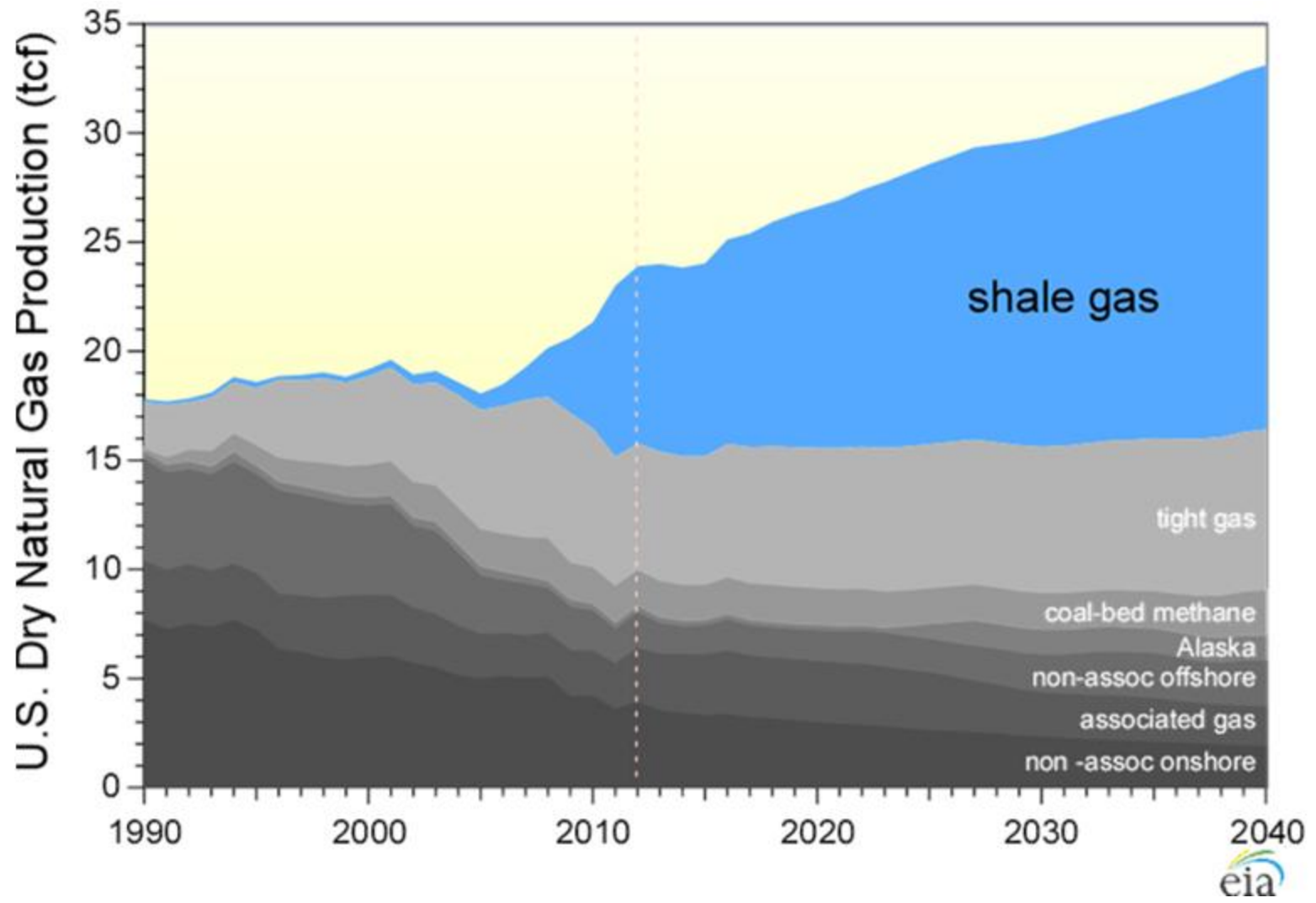


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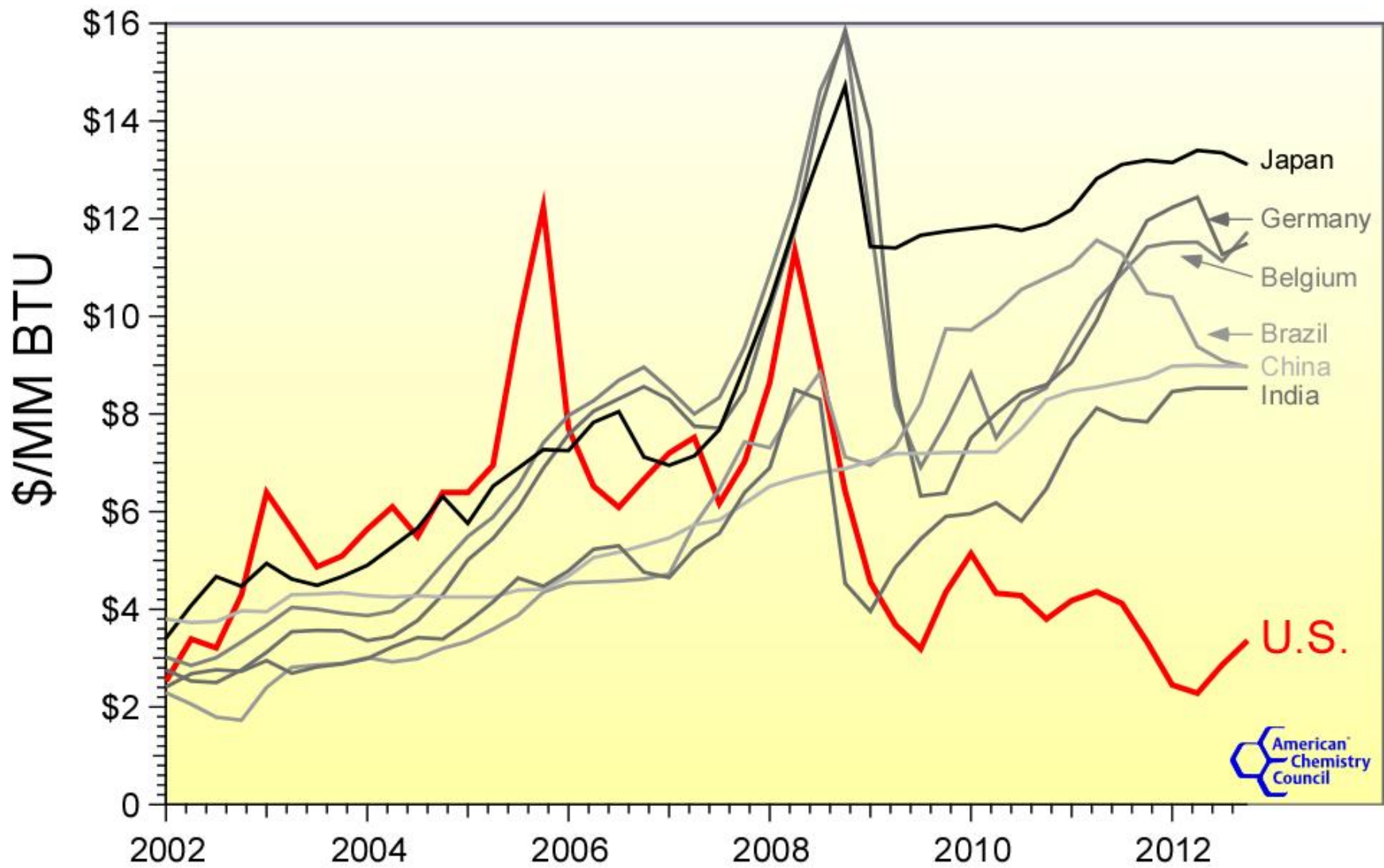




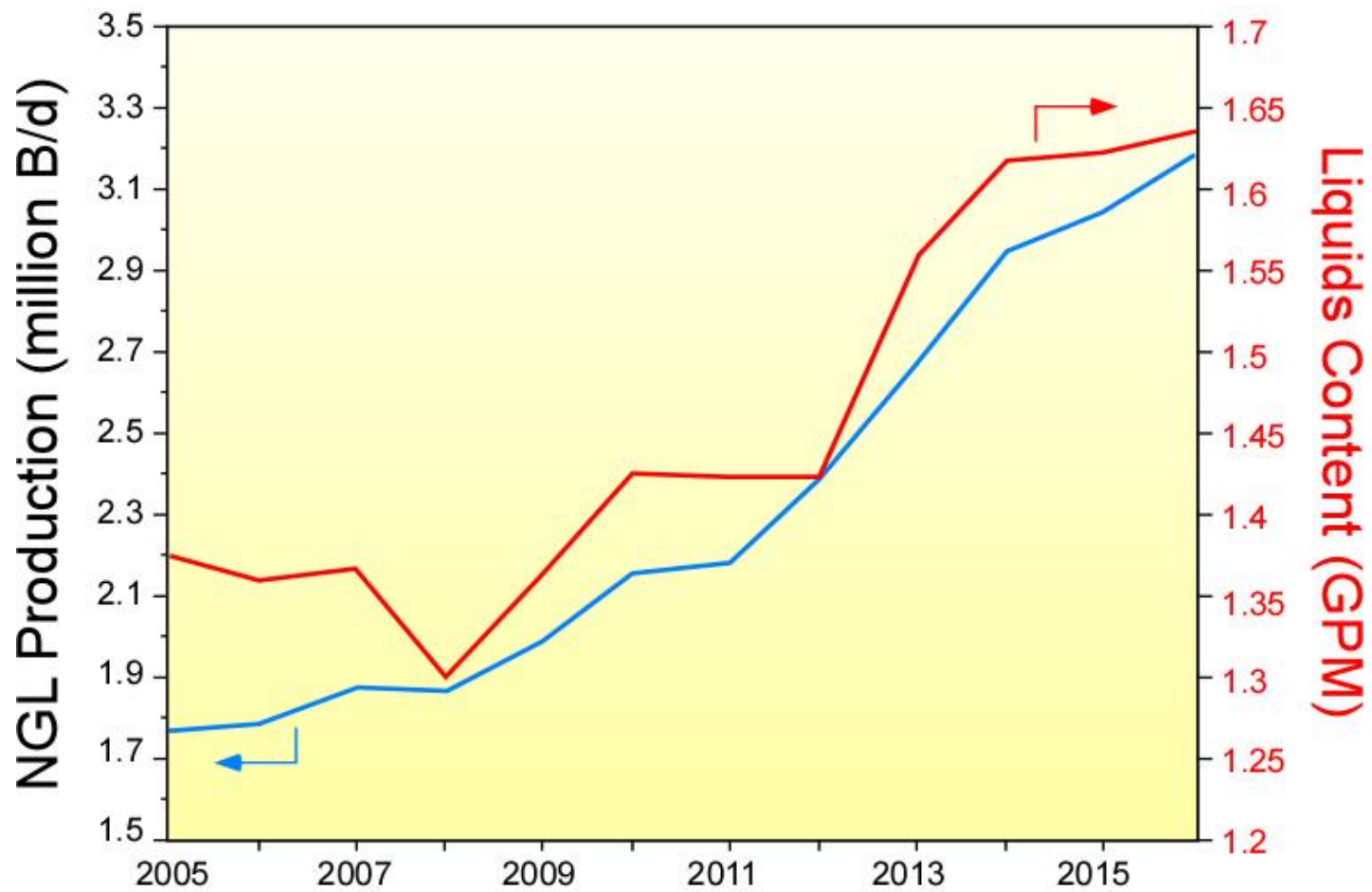
September 15, 2017



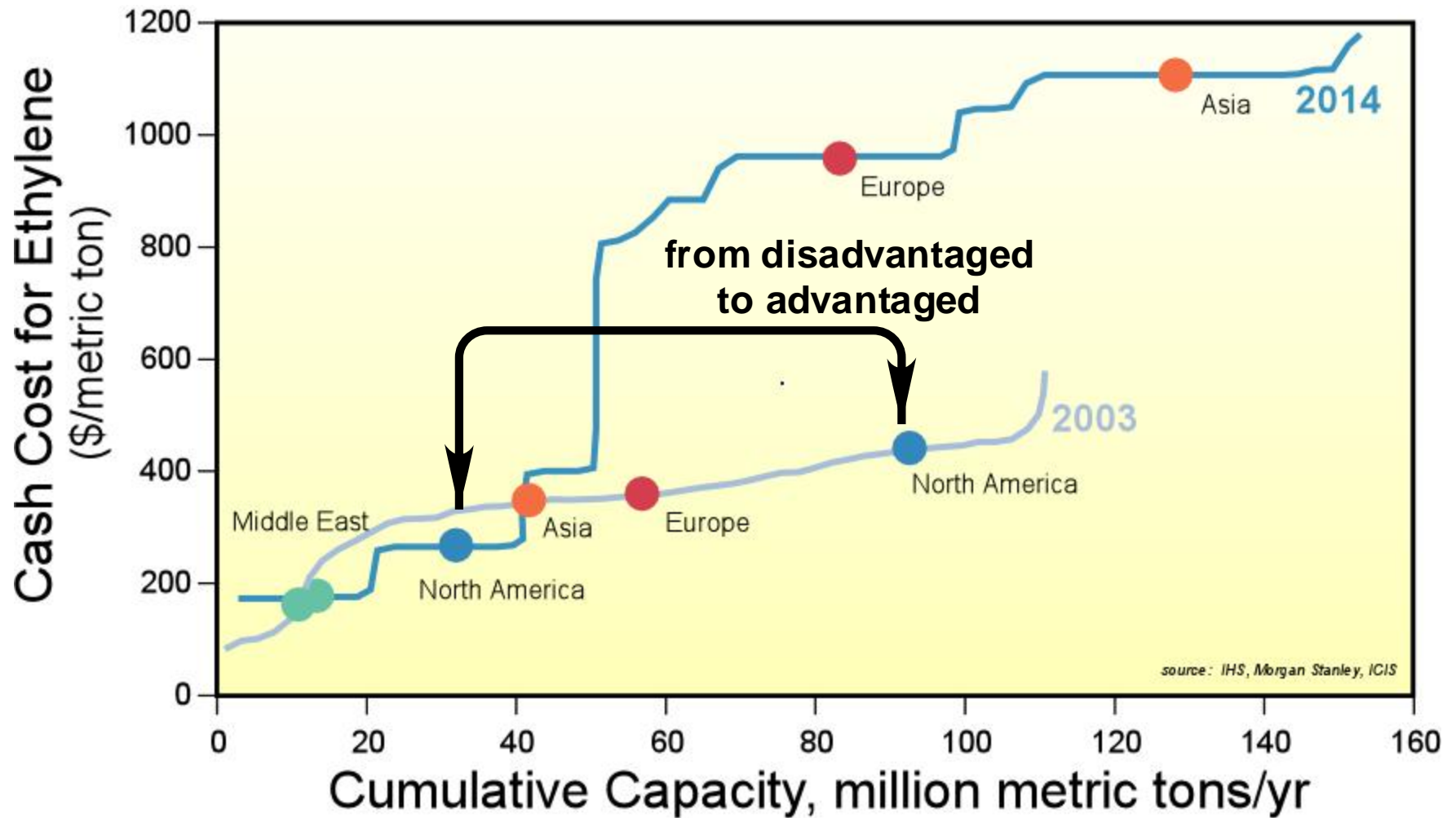
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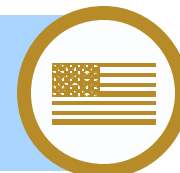
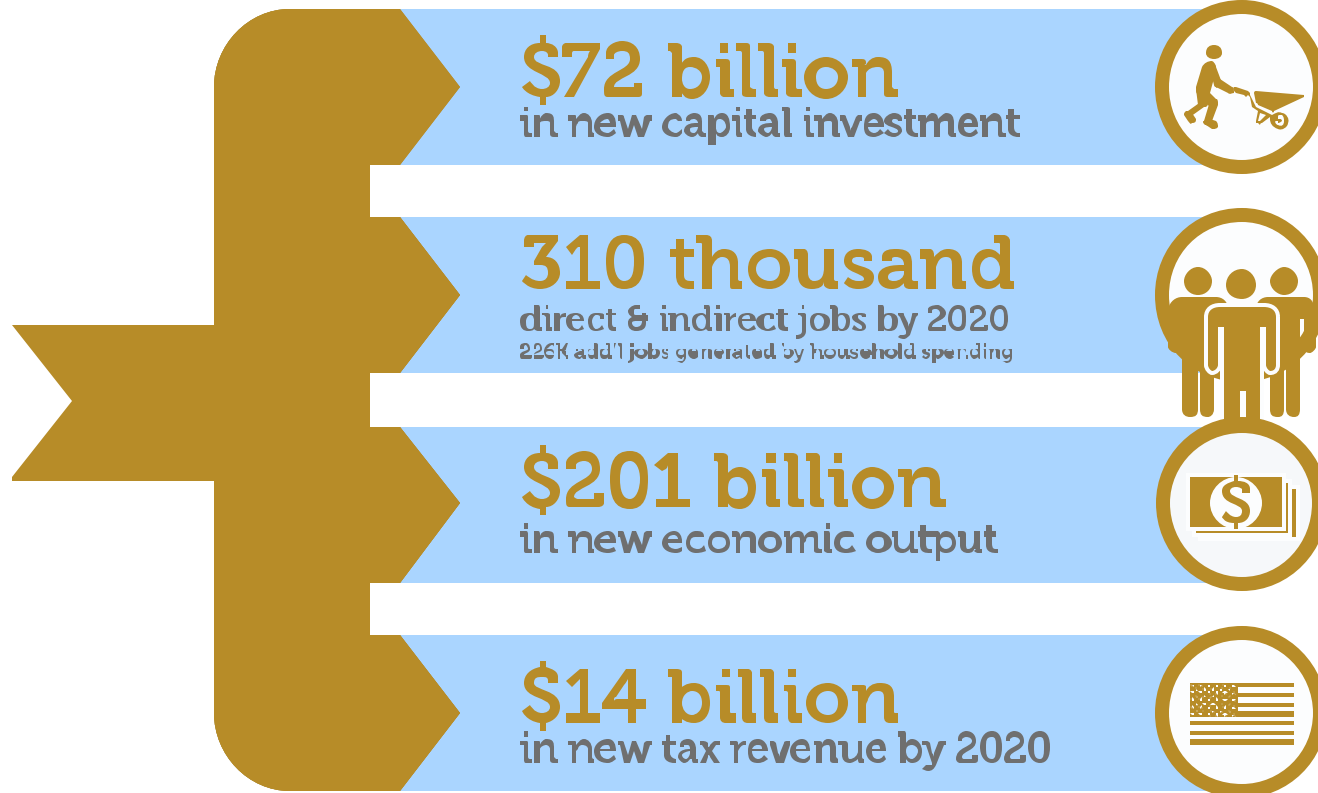


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**97**  
**new**  
**chemical**  
**industry**  
projects due  
to shale gas\*



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### Value of chemical shipments



**+48%**

### Chemical exports



**x2**

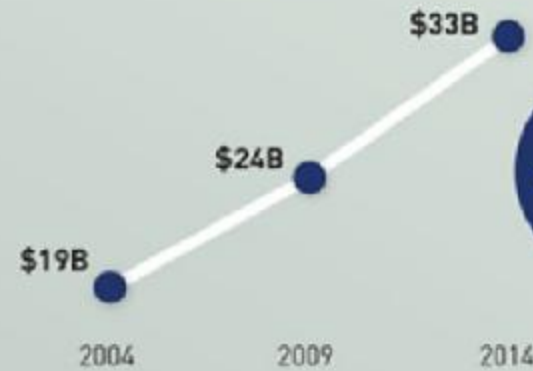
**OVER THE PAST DECADE**

### Research and development funding from the chemical industry



**+50%**

### Capital expenditure from the chemical industry



**+77%**

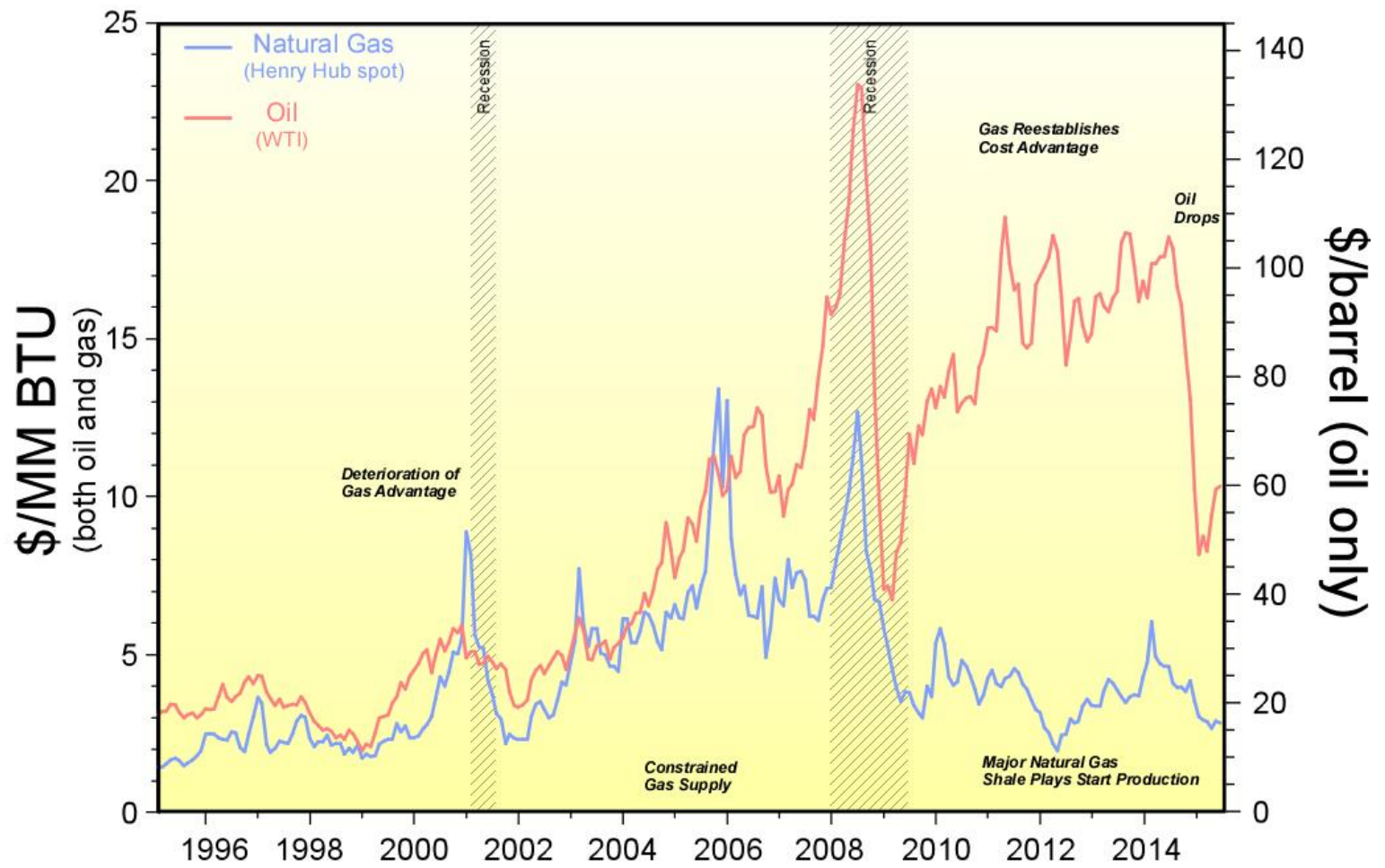


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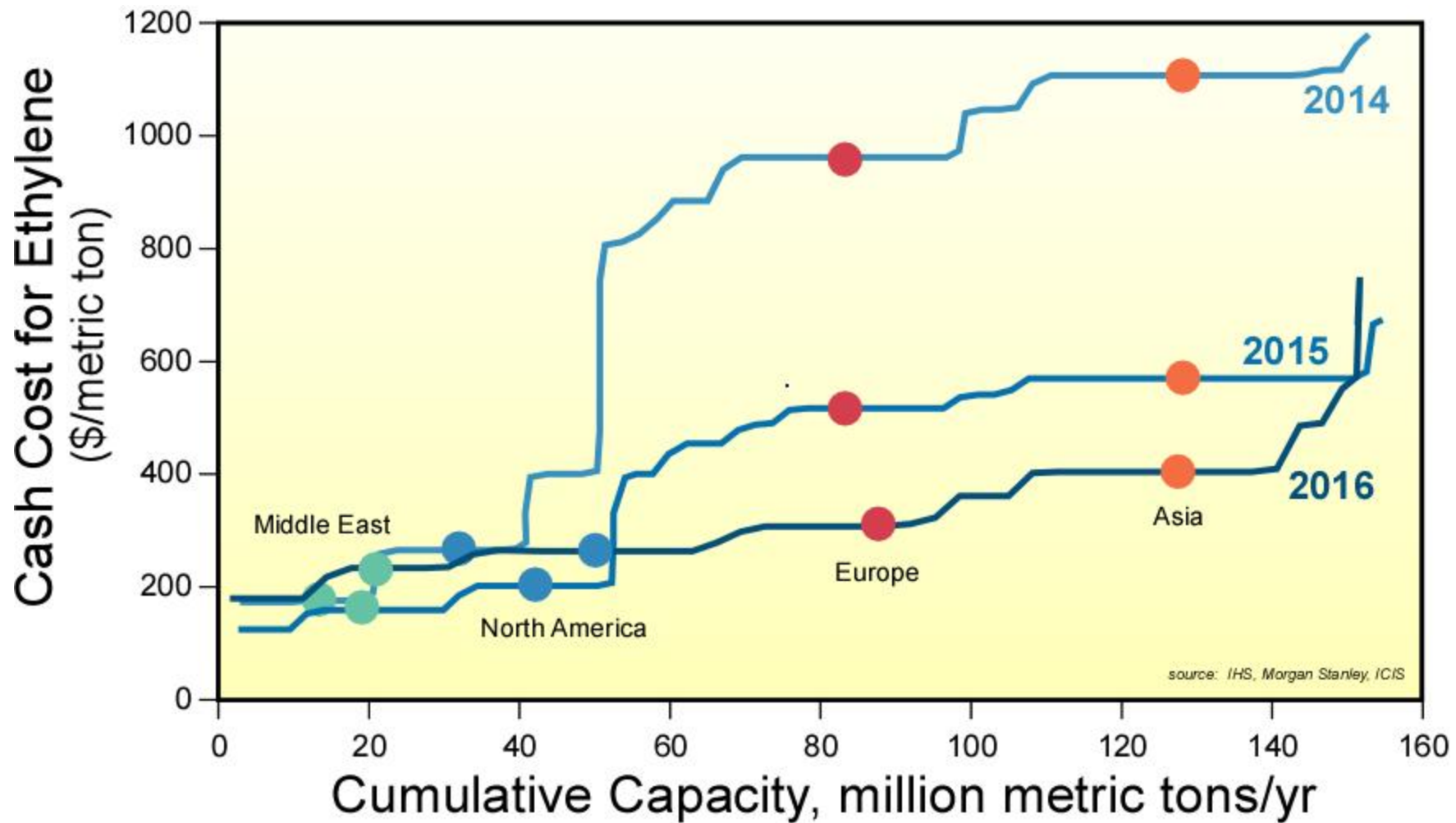


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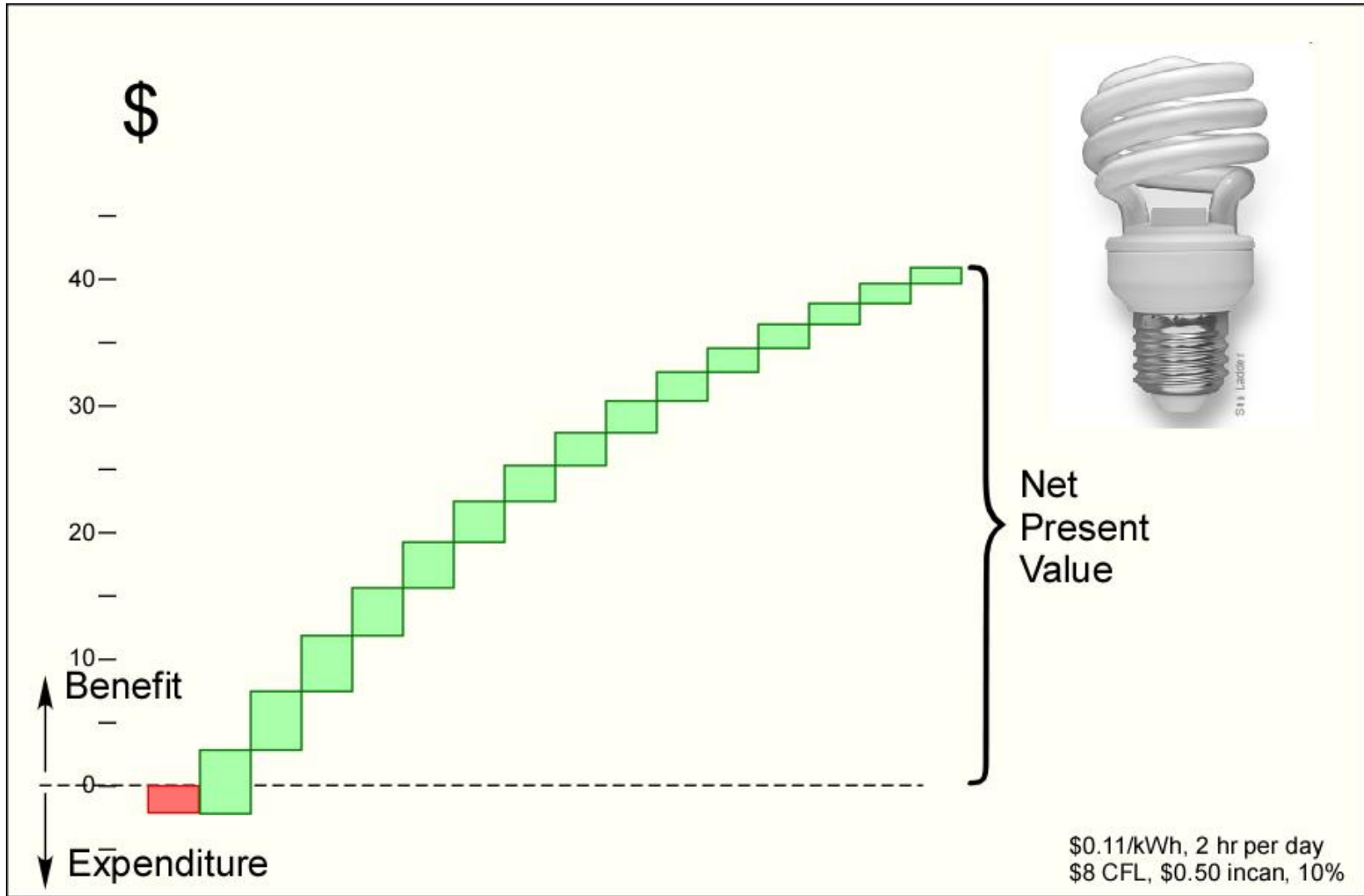


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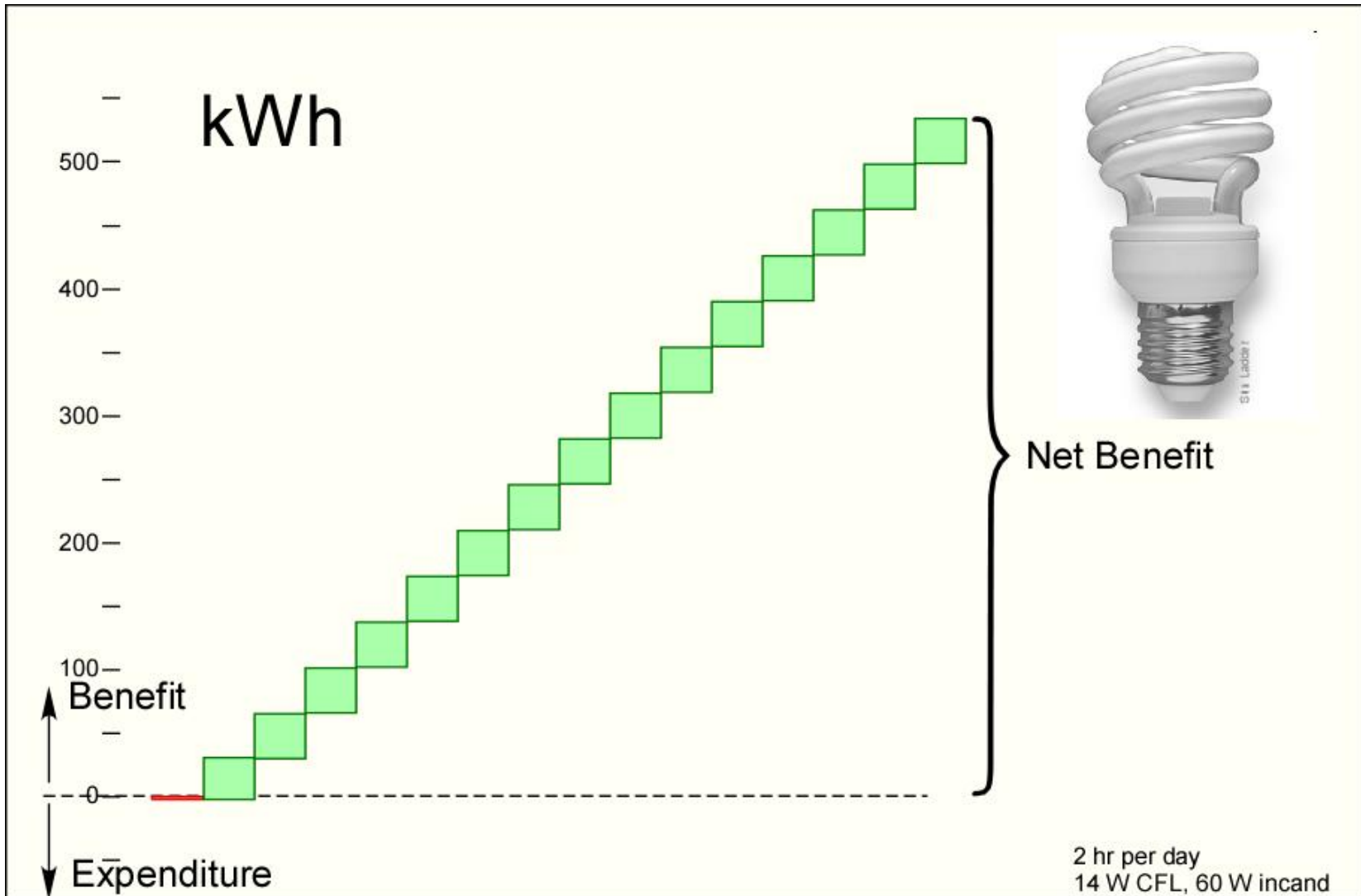




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# Case Study



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# K-Cup



# K-Cup

Relax...your K-Cups  
won't destroy the planet  
as soon as we thought...

Yet somehow,  
I still feel  
stressed.



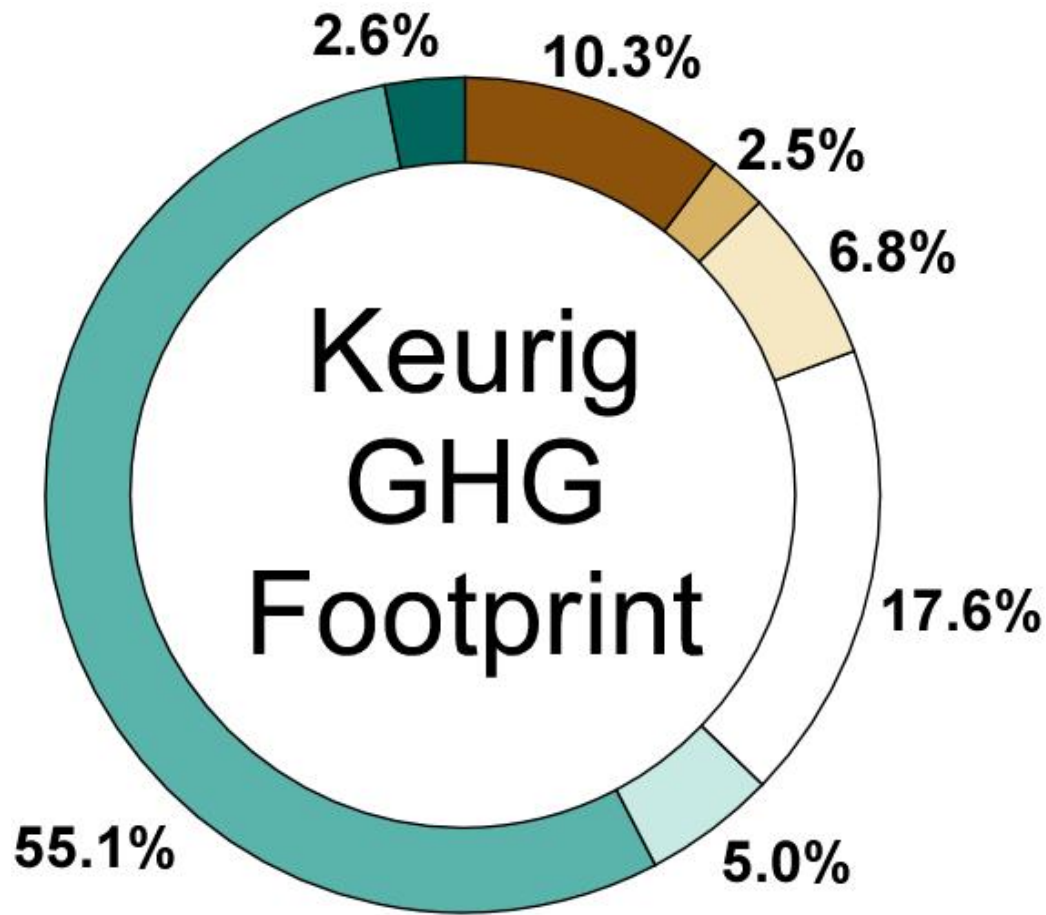
Rich Williams cartoon accompanying Loepp, Don; "Encouraging progress on K-Cup sustainability through materials.", *Plastics News*, 24 September 2015.



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# Keurig Corporate Footprint

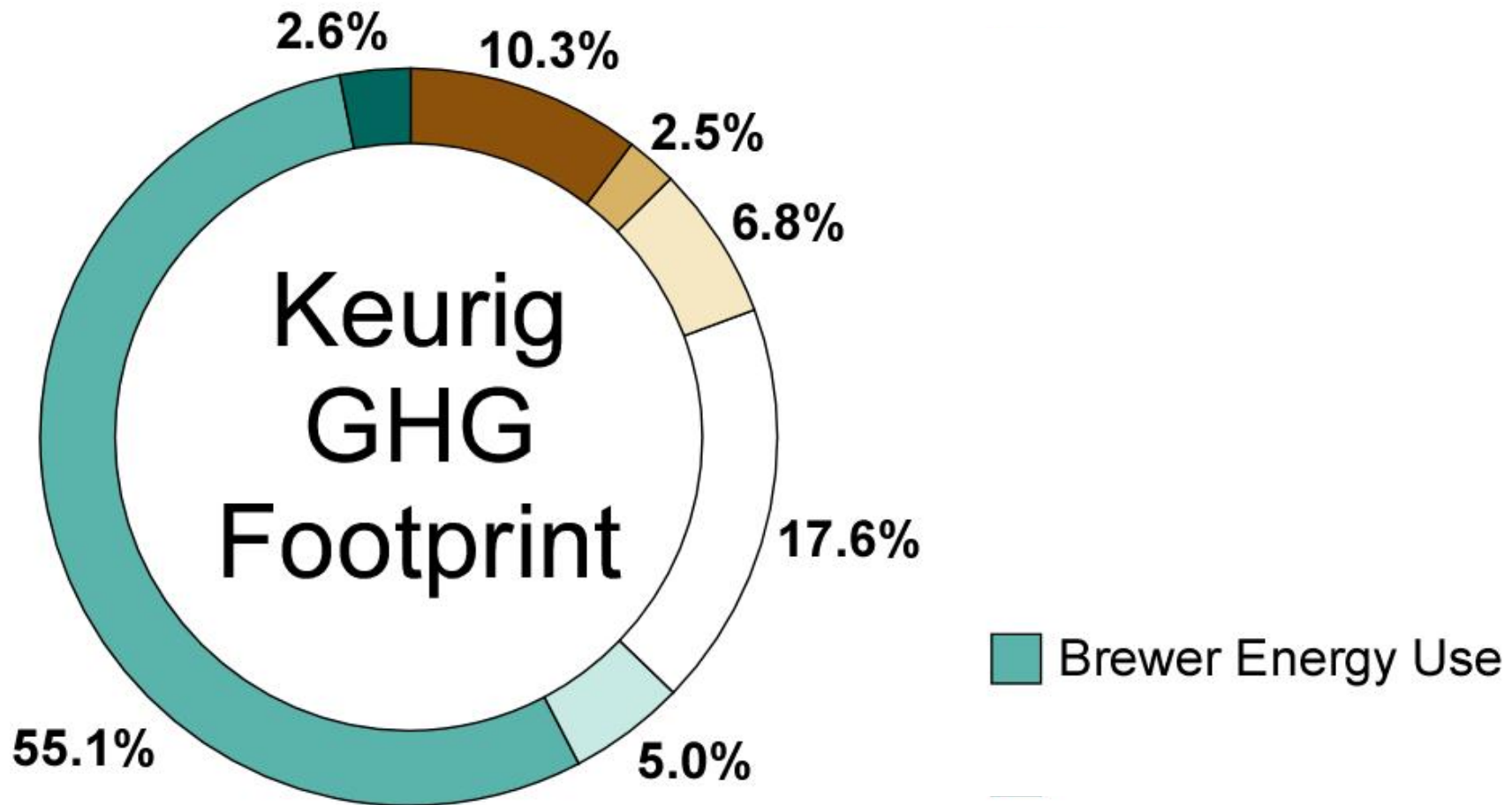


Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.



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# Keurig Corporate Footprint

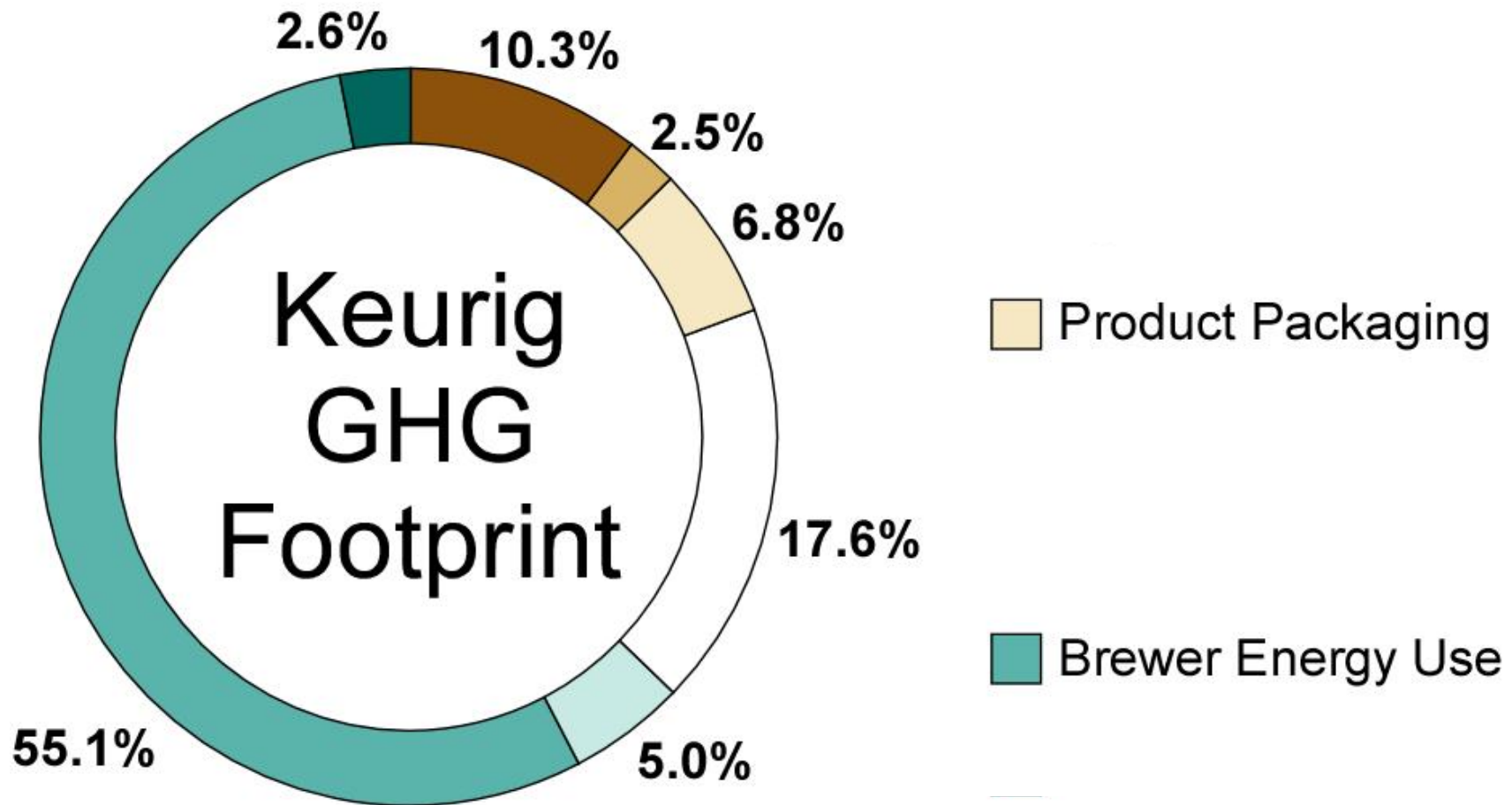


Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.



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# Keurig Corporate Footprint

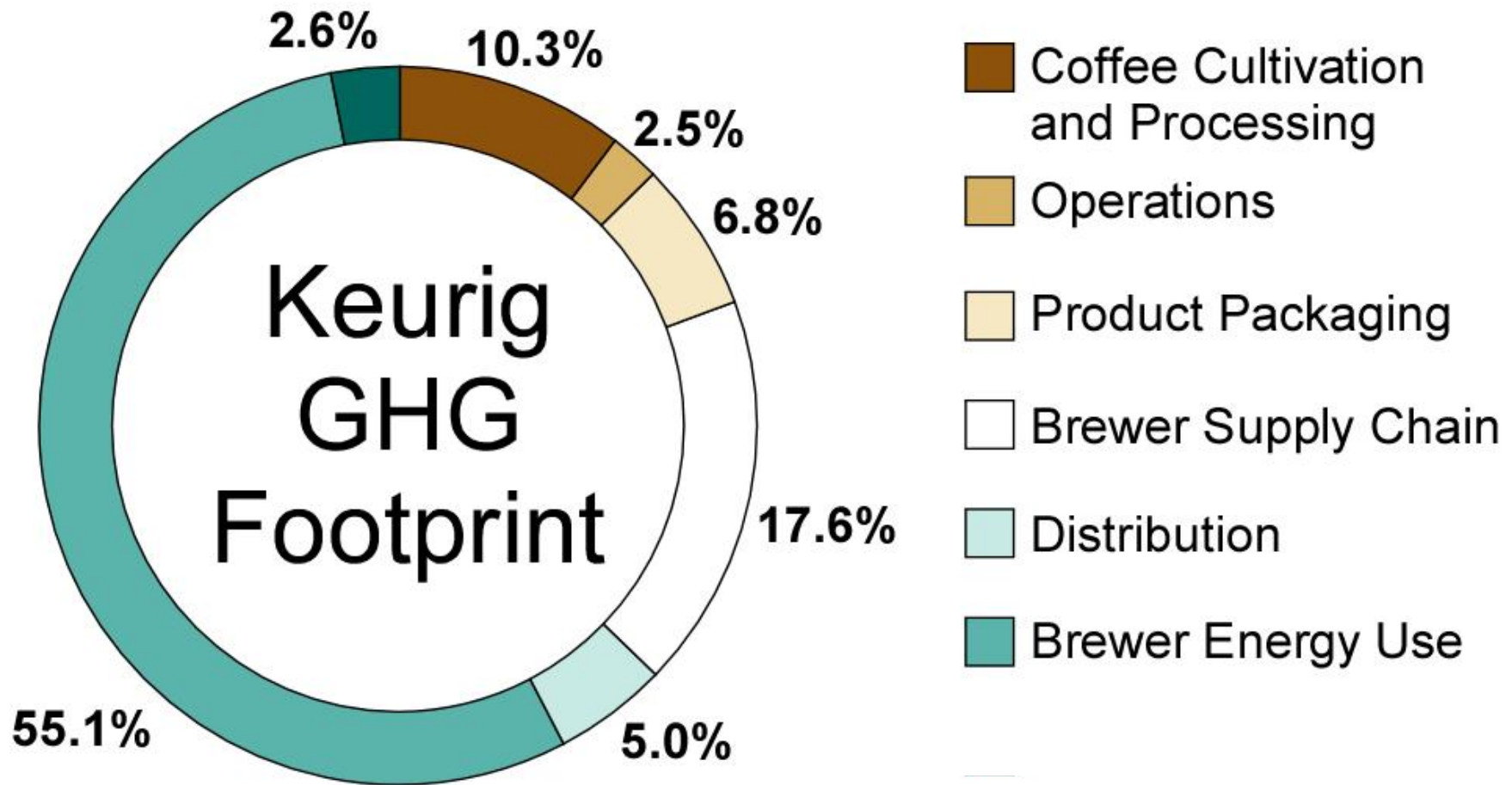


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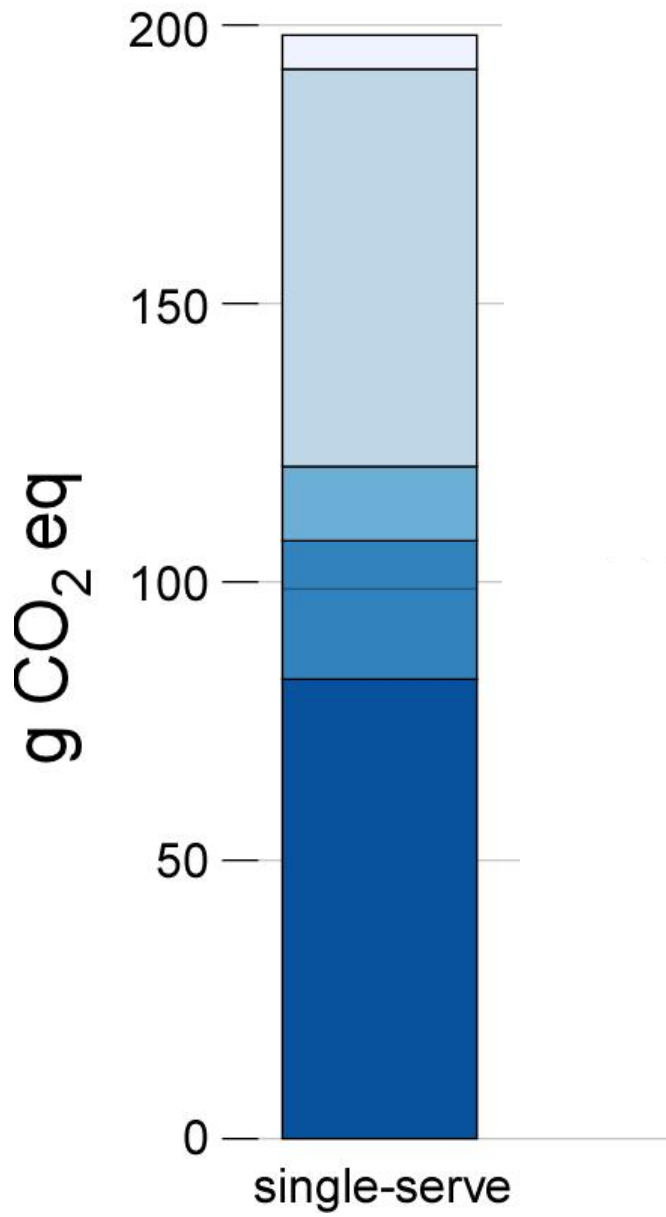
# Keurig Corporate Footprint



Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.



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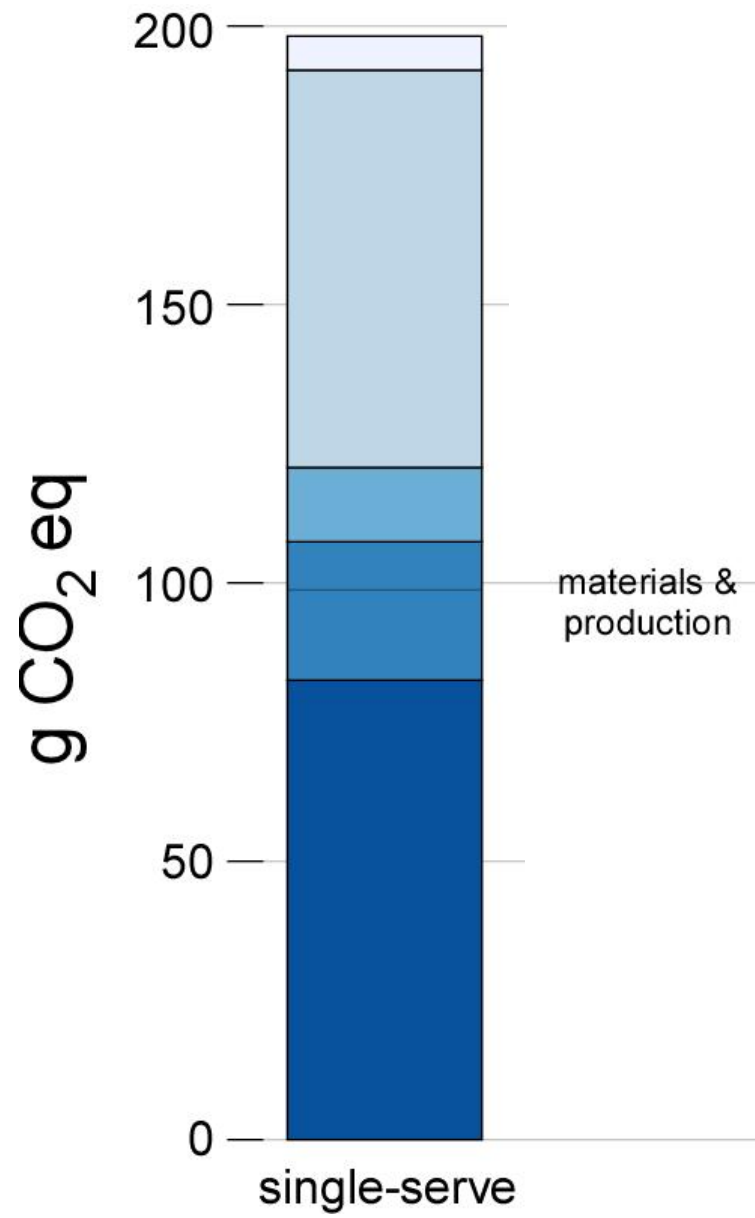


Quantis, Chayer, Julie-Anne; Kicak, Karine; "Life Cycle Assessment of coffee consumption: comparison of single-serve coffee and bulk coffee brewing", Prepared for PAC, 2 June 2015.



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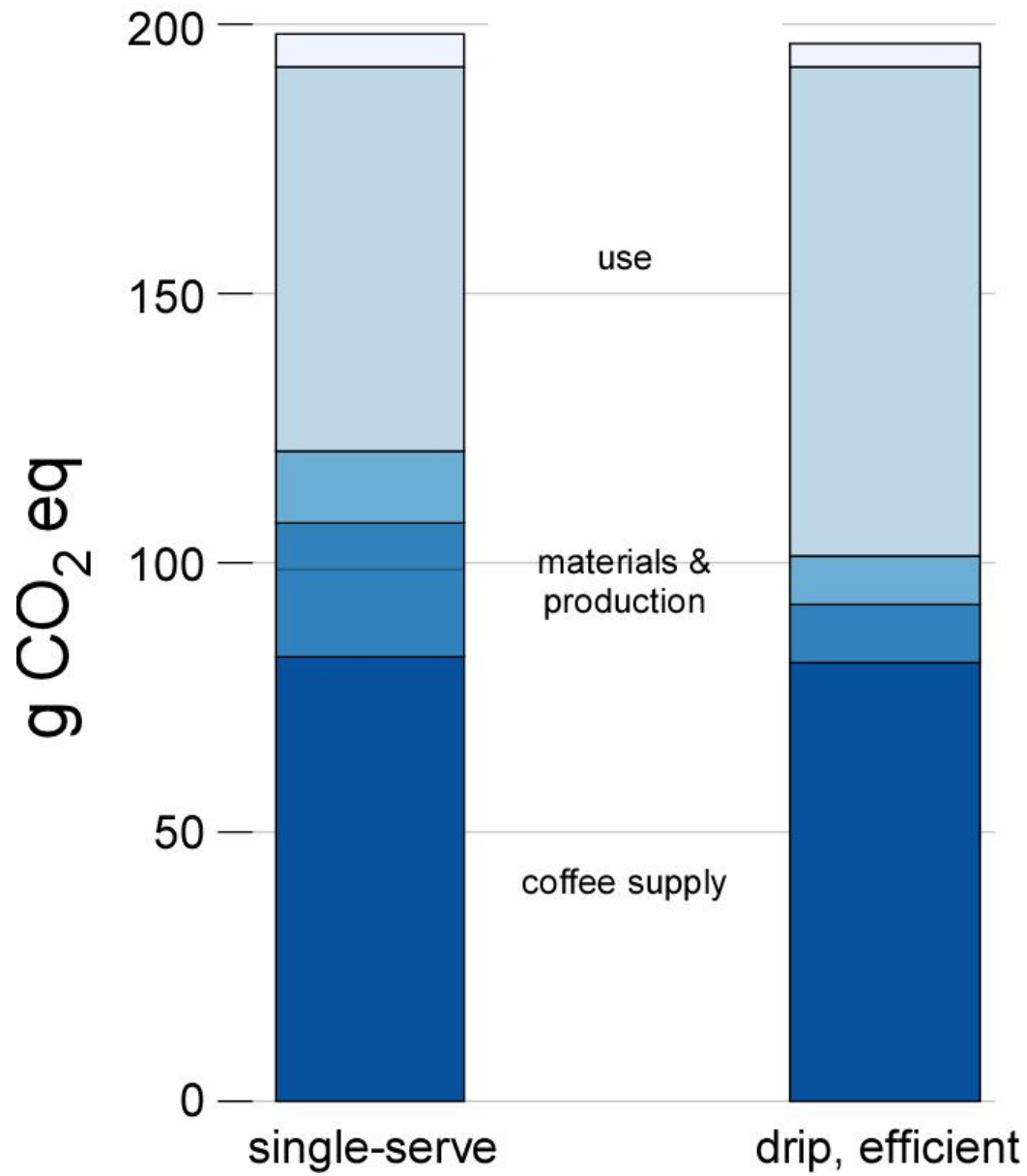




Quantis, Chayer, Julie-Anne; Kicak, Karine; "Life Cycle Assessment of coffee consumption: comparison of single-serve coffee and bulk coffee brewing", Prepared for PAC, 2 June 2015.



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Quantis, Chayer, Julie-Anne; Kicak, Karine; "Life Cycle Assessment of coffee consumption: comparison of single-serve coffee and bulk coffee brewing", Prepared for PAC, 2 June 2015.



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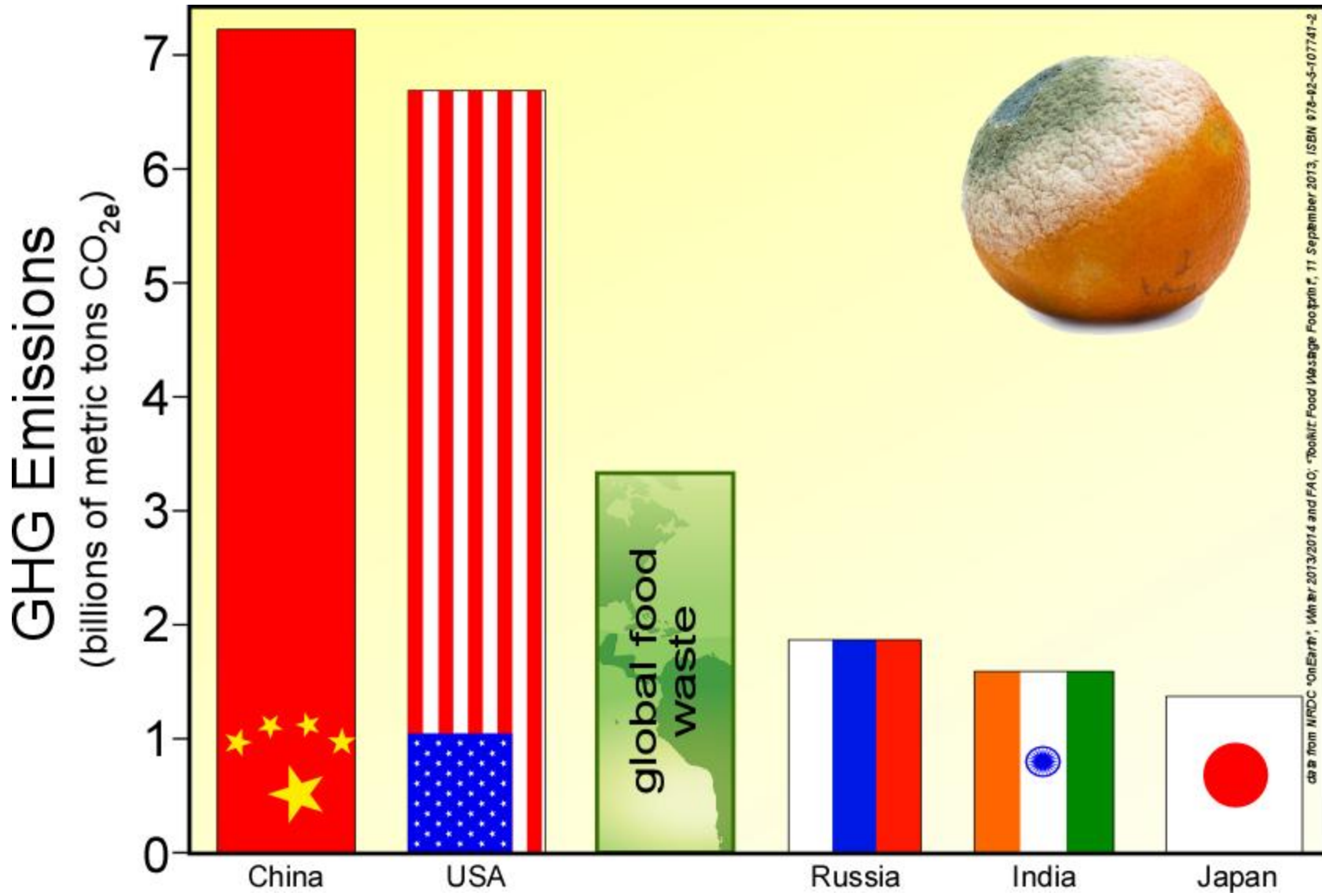
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30-40% food grown  
is wasted.  
Much of it to  
spoilage.

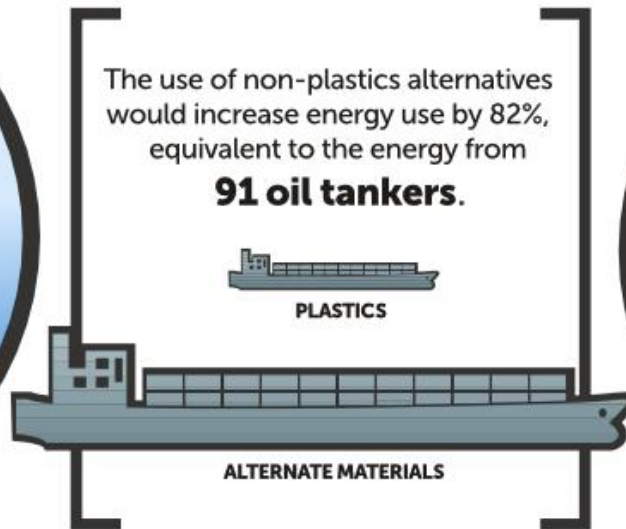


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**Most plastics can be recycled**



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Package Type	Contents	Impact per 100 oz Cereal		
		Landfill Discards* (g)	Process GHG** (kg CO <sub>2</sub> Eq)	Total Energy** (MJ)
Paperboard and HDPE Liner	11 oz	380.0	.861	12.1
Stand-Up Pouch	12 oz	117.5	.265	9.25

Reduction vs Box	
Landfill Discards	<b>68%</b>
GHG	<b>69%</b>
Energy	<b>23%</b>



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### Re-Closable Cap

- Precision pouring
- Maximum filling content utilization

### Flexible Design

- Four Print Surfaces
- Superior drop resistance
- Reduce excess head space
- Improved dispensing
- Collapses easily

### Top and Bottom Handles

- Easy handling

### Cubic Shape

- Shelf Stable & Maximizes Shipping Efficiency

### Space Saving

- Ships and Stores Flat when Unfilled



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# 2025 Sustainability Goals



Leading the  
Blueprint



Delivering  
Breakthrough  
Innovations



Advancing a  
Circular  
Economy



Valuing  
Nature



Increasing  
Confidence in  
Chemical  
Technology



Engaging  
Employees for  
Impact



World-Leading  
Operations  
Performance

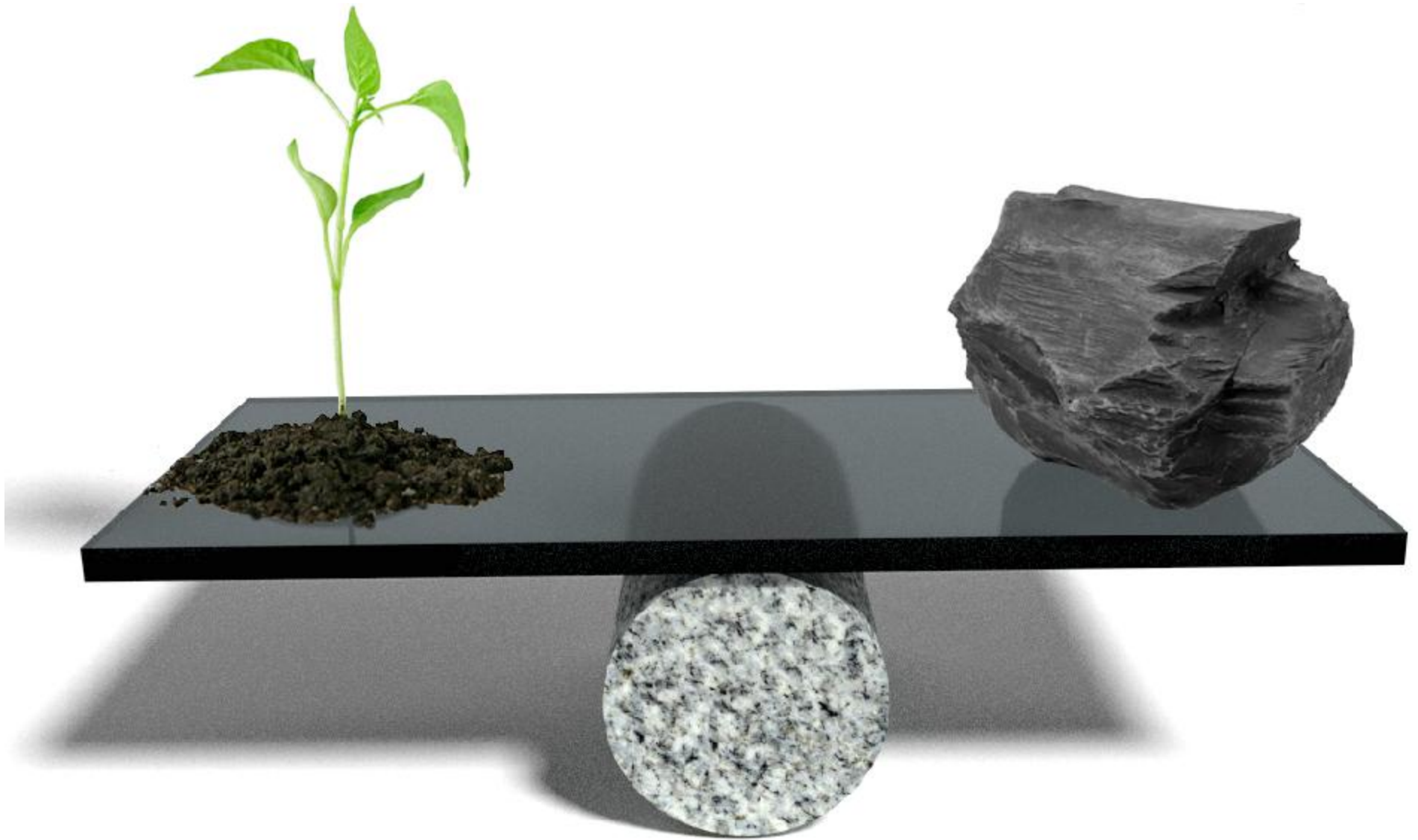


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September 15, 2017





September 15, 2017



September 15, 2017