



# Frugal Innovation for the Resource and Energy Industries: Developing and Deploying New Technologies During the Lean Times

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[www.perrons.net](http://www.perrons.net)

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# Acknowledgement of Traditional Owners

*QUT acknowledges the Turrbal and Yugara, as the First Nations owners of the lands where QUT now stands.*

*We pay respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of teaching, research and learning.*

*QUT acknowledges the important role Aboriginal and Torres Strait Islander people play within the QUT community.*

- Who am I?
- The important role of mining and energy in the Australian economy
- The compelling case for innovation in these industries
- What's changed?
- How to do frugal innovation: six strategies

# Who am I? (1)



- Currently a Professor at QUT – specializing in Innovation and technology management in energy and resource industries
- Until 2011, Shell International Exploration & Production (E&P) 
  - Executive Coordinator of global R&D portfolio at company HQ in the Netherlands
  - Smart Fields digital oilfield program
  - Manager – Learning & Development, Western hemisphere

# Who am I? (2)

- Lots of engagement with industry on issues pertaining to technology management, strategy—especially for energy and resource technologies
- UN's Expert Group - Resources and Energy



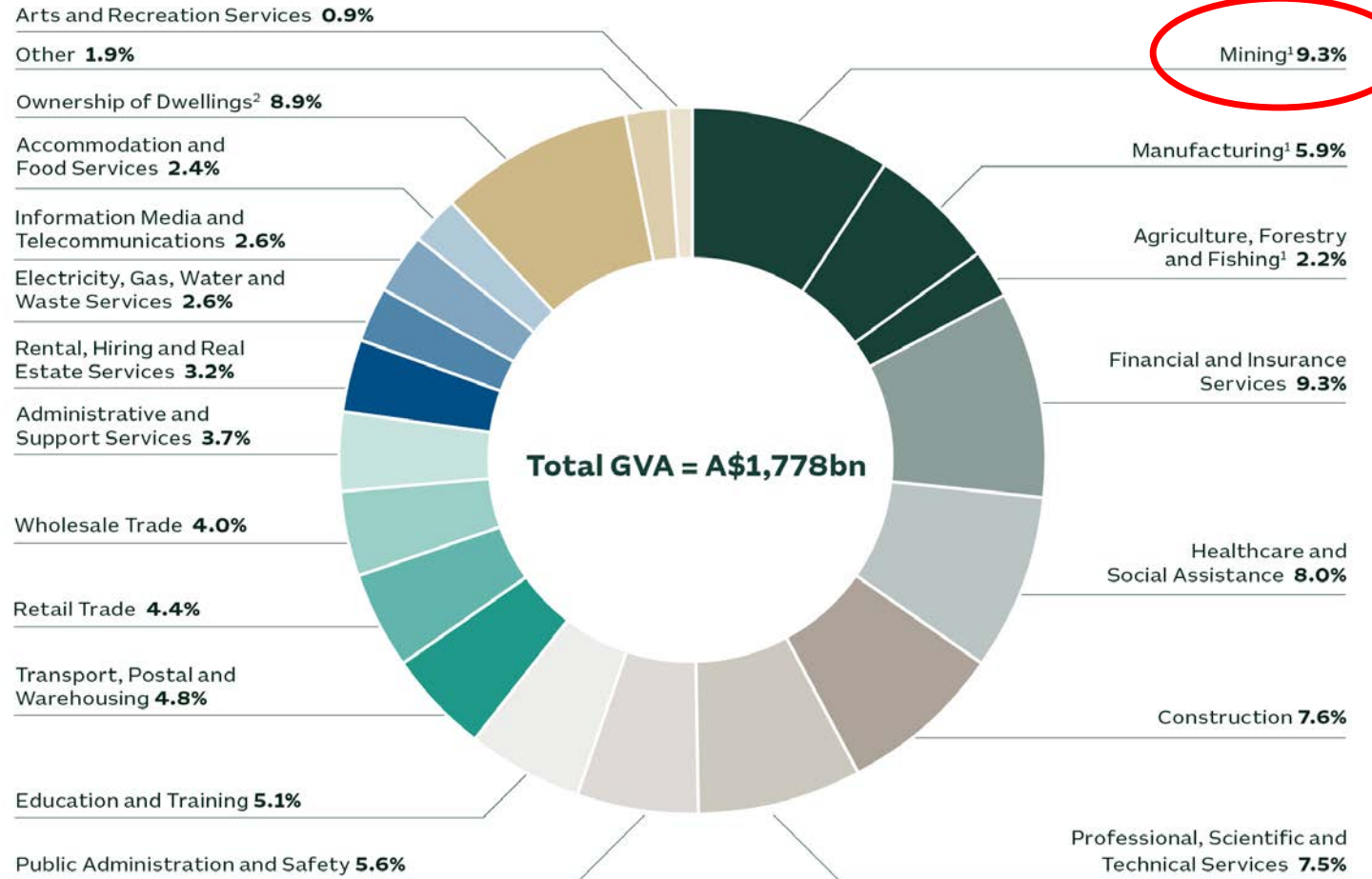
**Santos**



**RioTinto**

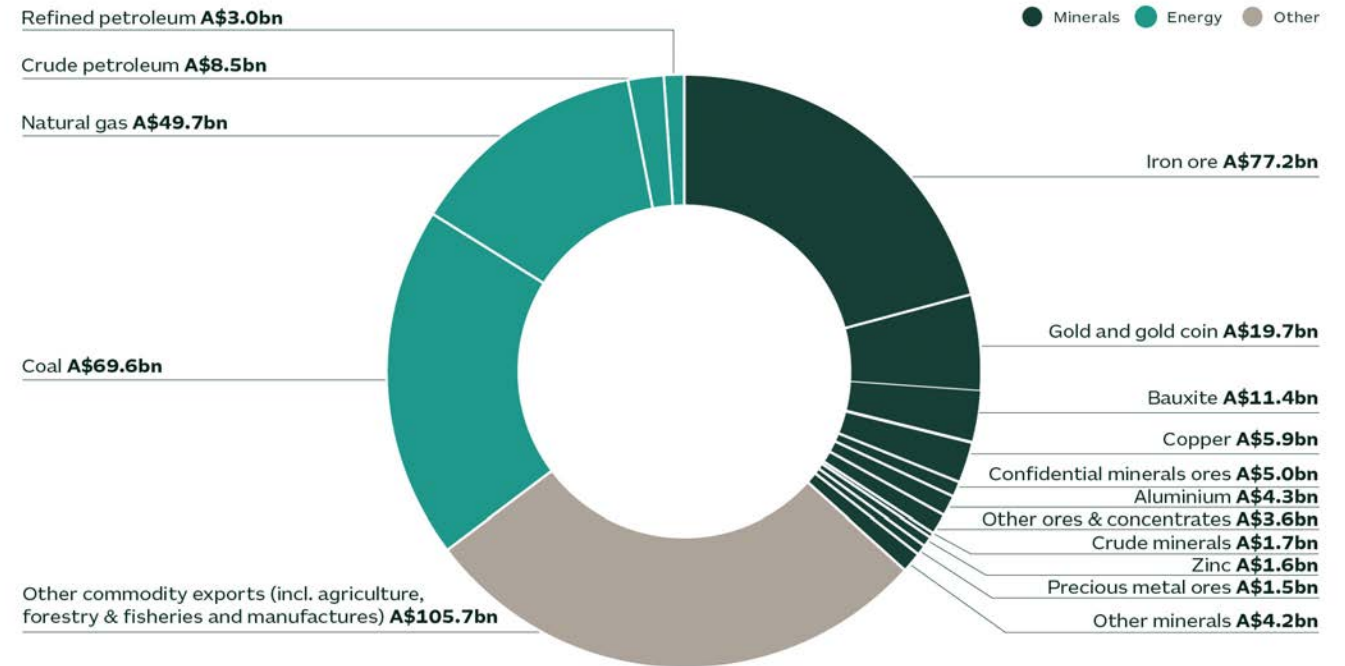


# Australia's Economy (Gross Value Added by Industry) in 2019



# Australia's Commodity Exports 2018- 2019

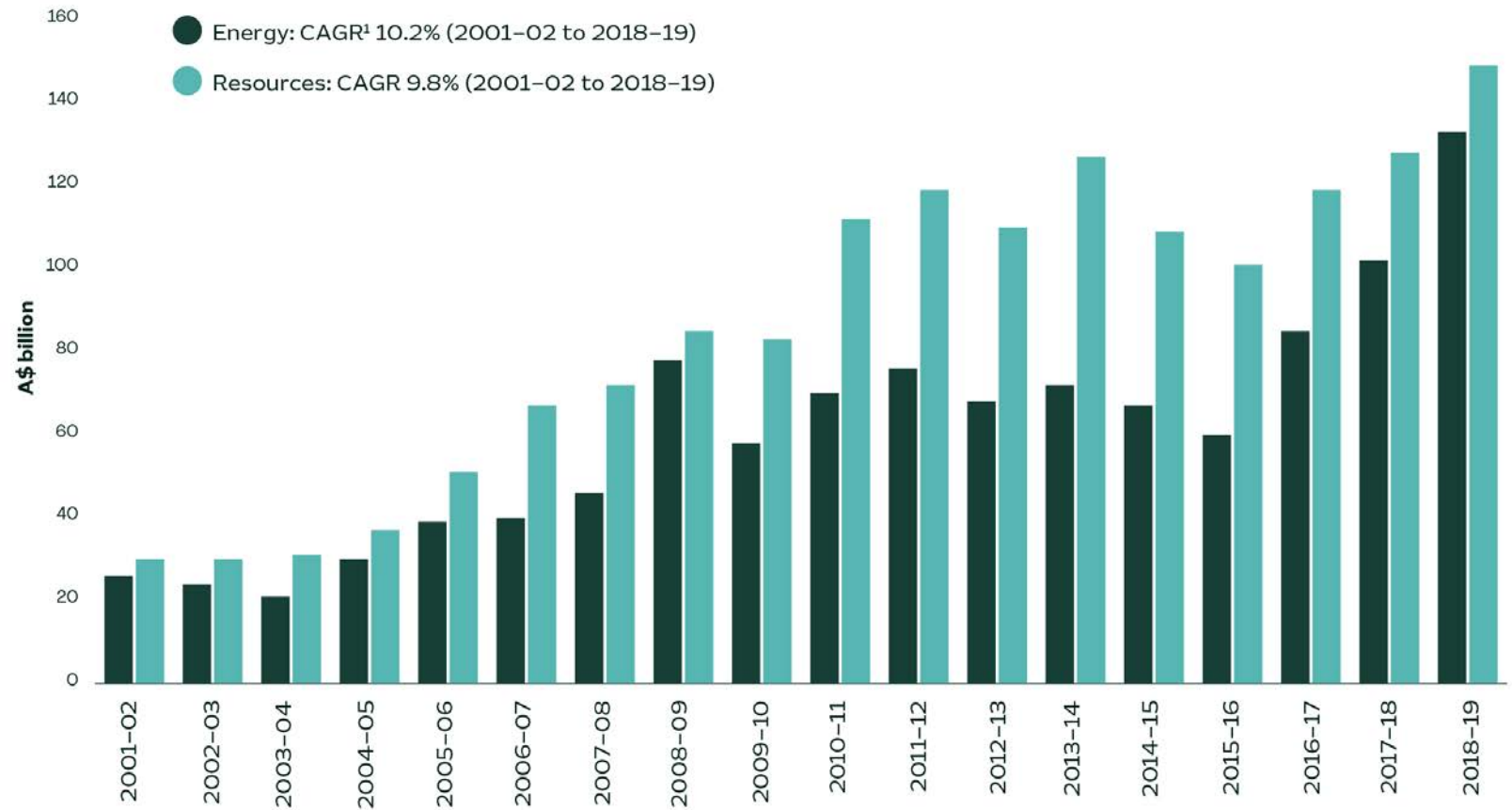
Minerals and energy, with global ranking for production and resources



Australia's world ranking for minerals and energy <sup>2</sup>								
	Production	Reserves		Production	Reserves		Production	Reserves
Iron ore	1	1	Uranium	3	1	Nickel	6	2
Bauxite	1	2	Zinc	3	1	Silver	6	3
Lithium	1	2	Cobalt	3	2	Natural gas	7	14
Gold <sup>3</sup>	2	1	Black coal	4	4	Tin	8	4
Lead	2	1	Brown coal	6	2			
Rare earths	2	6	Copper	6	2			

Source: Austrade's "Why Australia?" Benchmark Report 2020 - <https://www.austrade.gov.au/International/Invest/Resources/Benchmark-Report>

# Australia's Resource and Energy Sector Growth 2001-2019





# The need for innovation (1)

Royal Dutch Shell PLC [+ Add to myFT](#)

## Shell slims down to shape up for the energy transition

Job cuts are part of effort to rewrite script during the pandemic for a lower-carbon future

Emissions

### Santos fast-tracks net zero emissions goal

Santos has brought forward its net-zero goal for emissions by a decade, putting it ahead of peers on climate commitments by Australian oil and gas producers.

BUSINESS

## BP Bets Future on Green Energy, but Investors Remain Wary

New CEO is tilting the British energy company away from oil, hoping to profit instead from wind and solar power



Most of today's fossil fuel-based energy companies realize that they have to adapt or die

- Become “net zero” with those parts of their operations that will continue to be related to fossil fuels
- ... while also transitioning to green energy sources

# The need for innovation (2)

Coal [+ Add to myFT](#)

## Australia's banks stop funding coal as trading partners decarbonise

Move by ANZ means industry will now have to seek financing from overseas



Australia's A\$20bn a year thermal coal industry is under pressure due to Covid-19, with prices of high quality coal down a quarter since January © Bloomberg

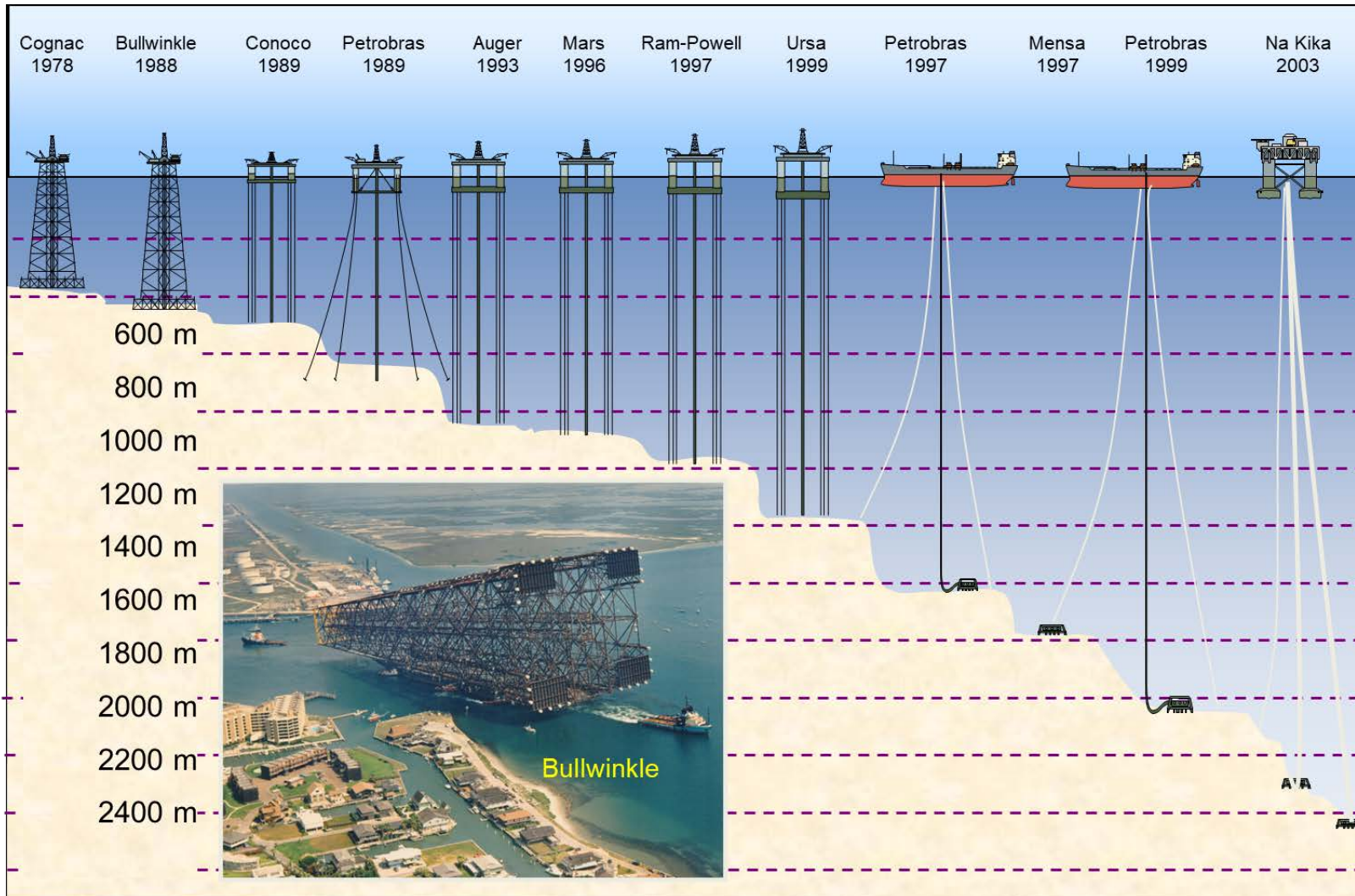
Jamie Smyth in Sydney OCTOBER 29 2020

## BHP to cut its greenhouse gas emissions by 'at least' 30% by 2030

By James Murray 10 Sep 2020

FEATURES & ANALYSIS MINING COAL

# The need for innovation (3)



**Deepwater milestones in the Gulf of Mexico and Brazil**

# The need for innovation (4)



# What's changed? (1)

POLITICS

## Federal Budget 2020 reveals Australia headed to record debt of almost \$1 trillion

By political correspondent Brett Worthington

Posted Tue 6 Oct 2020 at 6:32pm, updated Tue 6 Oct 2020 at 11:01pm



Source: ABC News, 6 October 2020

<https://www.abc.net.au/news/2020-10-06/budget-2020-tax-cuts-deficit-coronavirus/12731914>

# What's changed? (2)

## Exxon Mobil dropped from the Dow after nearly a century

BY STEPHEN GANDEL  
AUGUST 25, 2020 / 7:01 AM / MONEYWATCH

### Exxon halts contributions to employee retirement plan

By Erwin Seba

3 MIN READ



HOUSTON (Reuters) - Exxon Mobil Corp [XOM.N](#) is suspending the company's contribution to the U.S. employee retirement savings plan beginning in October, the company confirmed on Wednesday.



## Shell cuts dividend for first time since WW2

30 April

Coronavirus pandemic



Sources: <https://www.cbsnews.com/news/dow-jones-exxon-mobil-pfizer-raytheon-replaced-salesforce-amgen-honeywell/>

<https://www.reuters.com/article/us-exxon-mobil-retirement-idUSKCN2510IG>

<https://www.bbc.com/news/business-52483455#:~:text=Royal%20Dutch%20Shell%20has%20cut,of%20its%20share%20buyback%20programme.>

# What's changed? (3)





# Frugal Innovation





- *Jugaad* innovation emerged in 2012
  - “Jugaad” is a Hindi word meaning an innovative fix born from ingenuity and cleverness
- Frugal innovation largely rooted in philosophical underpinnings of Jugaad innovation



# Six principles of Frugal Innovation



- 1) Engage & Iterate
- 2) Flex Your Assets
- 3) Create Sustainable Solutions
- 4) Shape Customer Behavior
- 5) Co-Create Value with Prosumers
- 6) Make Innovative Friends

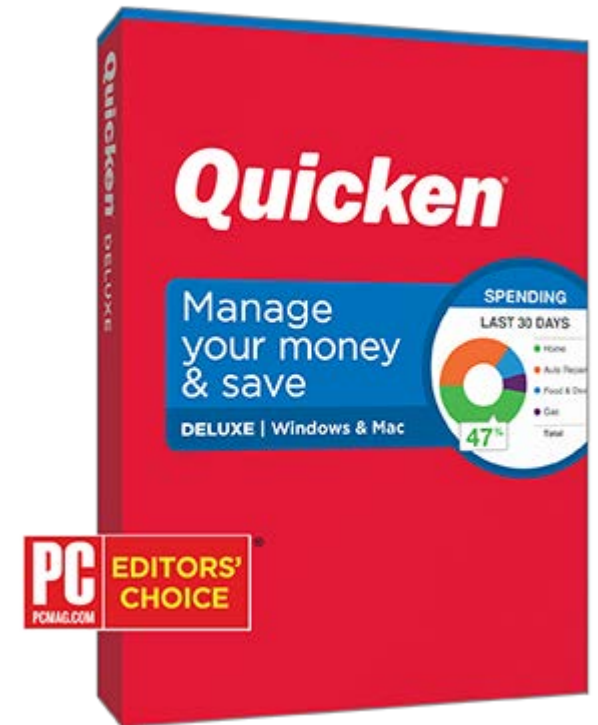
# Principle 1: Engage and Iterate (1)



- Instead of relying on insular R&D departments, observe your customers' behavior in their natural environment
- Large, corporate R&D labs based on “big science” and technology push are less common and less effective
- Iteratively go back and forth between the customer and the lab to refine designs

# Principle 1: Engage and Iterate (2)

- Example: Intuit's Quicken software for personal accounting
- CEO Brad Smith would hang out at Staples stores (like an American version of Officeworks) and offer to go home with customers to observe how they actually installed and used the product
- “Follow me home” strategy



# Principle 1: Engage and Iterate (3)



- Deploy crowdsourcing and social media to find out what they want
- Use immersion techniques to identify latent needs
- Example: Fujitsu engineers worked side by side with mandarin farmers in Japan for several days to find ways to increase mandarin yields with digital technologies such as mobile phones and wireless sensors
- Make use of Big Data analytics

# Principle 1: Engage and Iterate (4)

Translating this to the resource and energy sectors:

- More hands-on observing of new products being used by end user
- Fostering a different kind of relationship between technology suppliers and service companies



# Principle 2: Flex your assets (1)



- Sharing resources

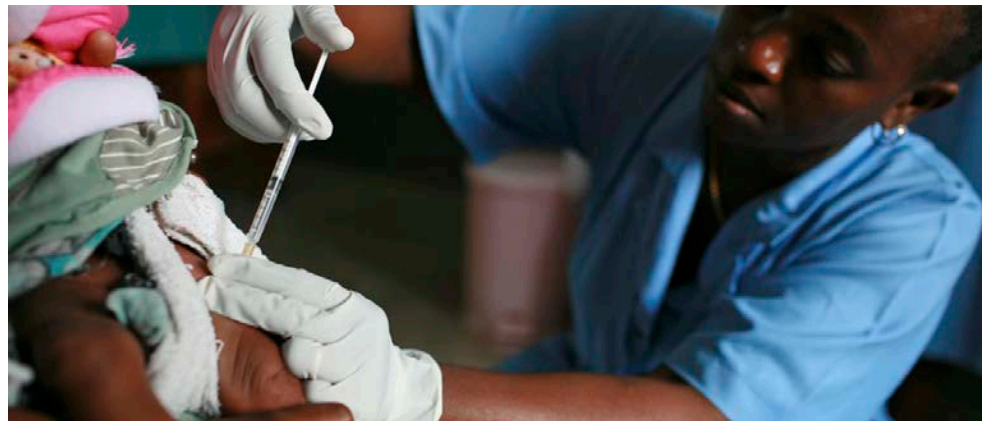


- What production and distribution assets within your firm sit idle sometimes?
- Why not allow other firms (potentially even rivals) to use them?
- Example A: Mars, the global food manufacturer, cooperates with competitors to share a distribution vehicle fleet
- Example B: in Africa and India, it has been common for years for competing telecoms companies to share mobile phone towers—and Western companies are now doing it, too



# Principle 2: Flex your assets (2)

- Find opportunities for *piggybacking*
  - What other industries might need a network, distributed asset, etc. where you need a similar network to be?
  - Example: Healthcare firms in Africa are using Coca-Cola's temperature-controlled supply chain to preserve life-saving AIDS medicines as they get delivered to remote villages



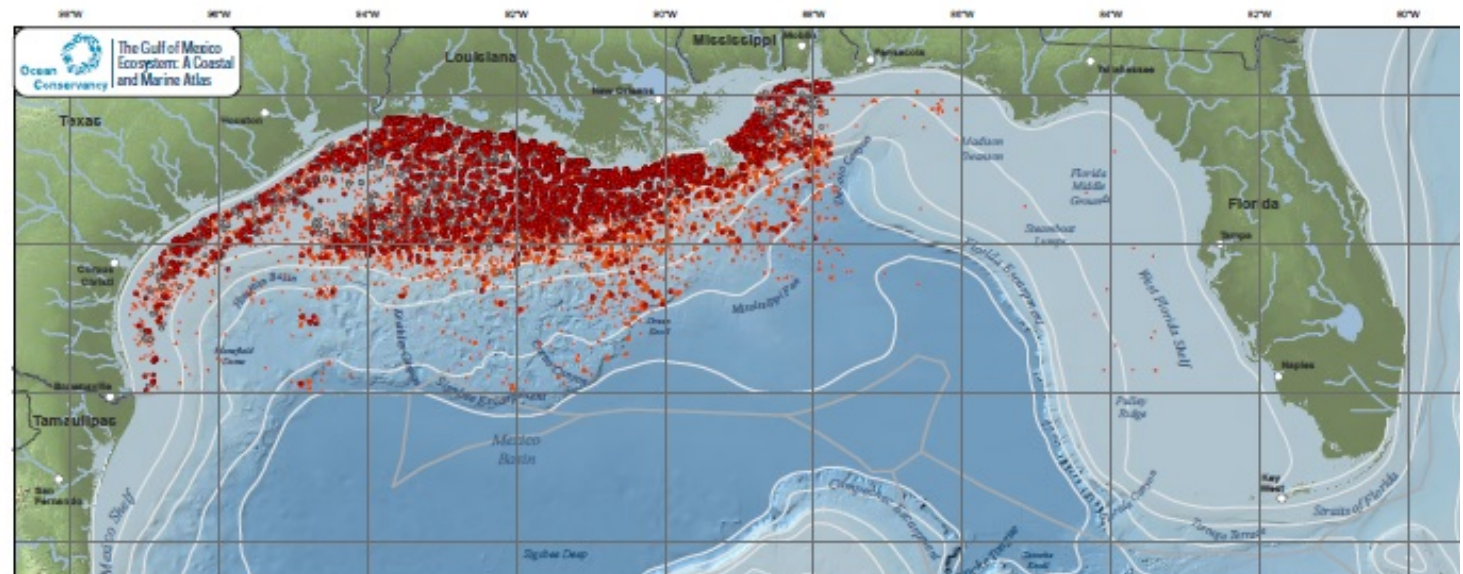
Source: <https://www.thedailybeast.com/coke-applies-supply-chain-expertise-to-deliver-aids-drugs-in-africa>

# Principle 2: Flex your assets (3)

HOME

## Fiber-optic loop to connect US Gulf platforms, onshore

Petrocom, a Gulf of Mexico cellular and microwave communications provider, is planning to create a fiber-optic ring to aid communications in the Gulf of Mexico. The high capacity of FiberWeb will provide capability for not only reliable voice communications, but video, cable television, and the Internet from platform to platform or platform to onshore.



# Principle 2: Flex your assets (4)



- **Share data** with partners
  - Provide end-to-end enterprise-wide visibility
  - Helps entire value network work together to detect changes and disruptions and alert everyone in the network so that they can work together to respond innovatively
  - Only works if you've digitized processes and assets, however
- Already seeing this with “smart” systems in oil & gas, e.g. Shell's electrical submersible pumps (ESPs) supporting Perdido asset in Gulf of Mexico

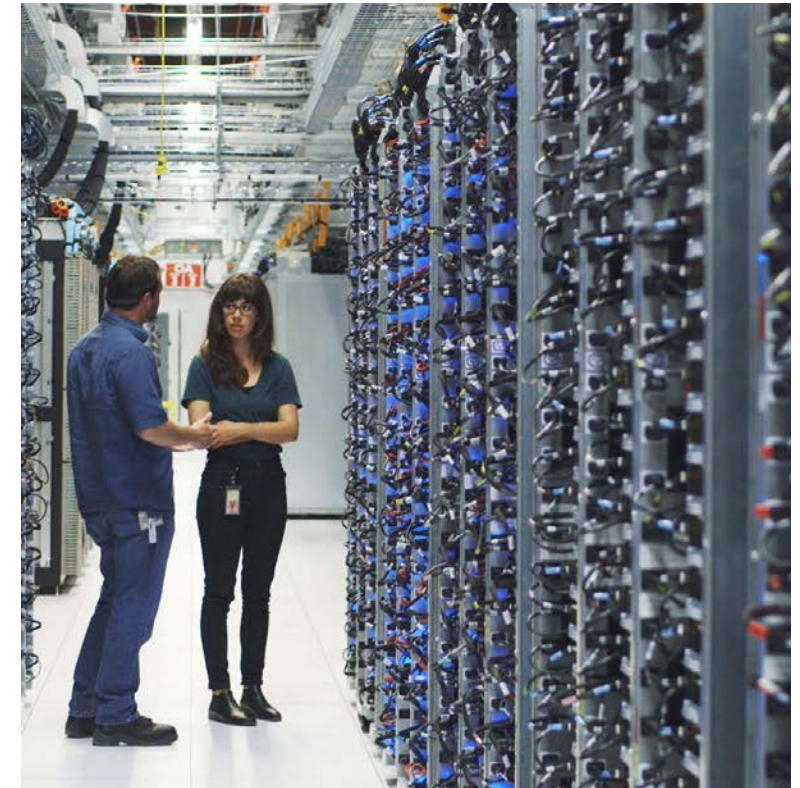
# Principle 3: Create sustainable solutions (1)



- With the greatest of respect to the environment...
  - Not creating waste is the *frugal* answer!
- Recycle and take part in the circular economy where possible
- Turning waste into wealth. Example: ATMI has created processes that remove gold microcircuitry from consumer electronics. Generates a bullion bar every two days!

# Principle 3: Create sustainable solutions (2)

- Innovate with multipurpose products in mind
  - Is one process' "waste" another process' feedstock input?
- Example: Qarnot Computing from France accepts computationally-intensive jobs for their servers that generate a lot of heat, but then use that heat to warm homes and offices for free nearby



# Principle 4: Shape customer behavior (1)



- Customers are often more wasteful than the companies that supply them
  - Example A: Unilever's chief supply chain officer, Pier Luigi Sigismondi, estimates that half the company's water consumption relates to how consumers use the product rather than what Unilever does directly
- Visualization
  - Example B: helping consumers be more frugal with their energy use by making them aware of how and where they use it

# Principle 4: Shape customer behavior (2)



- Social comparison
  - Letting customers know what their neighbors are doing can goad them towards frugality
  - Example: Telling electricity customers the average energy consumption in their neighborhood on average reduces consumption by 2%
- Gamification

# Principle 5: Co-create value with prosumers (1)

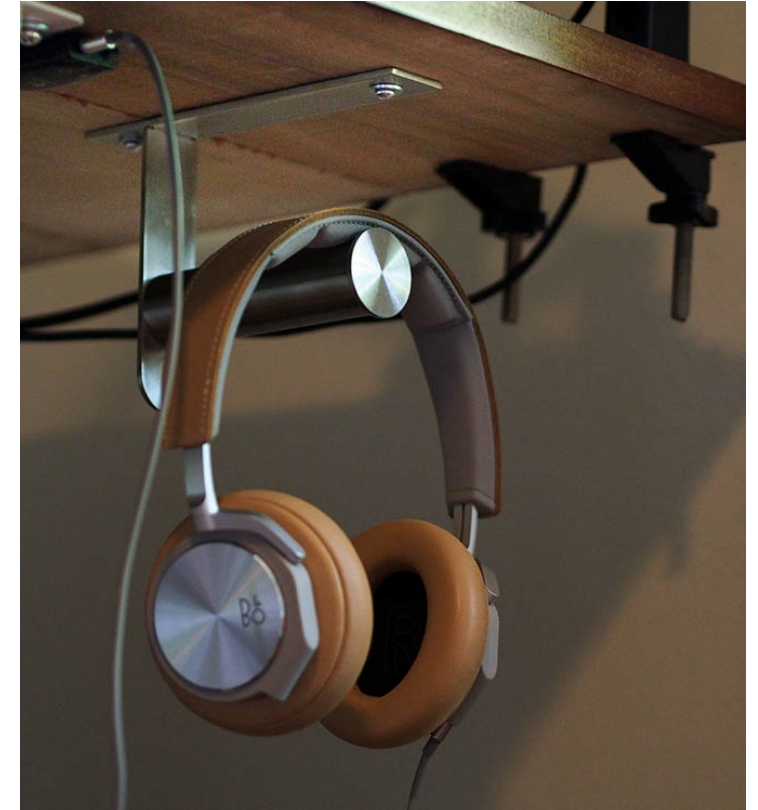


- The rise of the **prosumer**
  - People who **consume** your innovation are now able and willing to help you **produce** it
- Partially fueled by precipitous decline in the cost of 3D printers, open-source hardware, and open-source software
- Everyone can become a MacGyver (or equivalent)
- Peer-to-peer sharing platforms make it easy for fellow enthusiasts to collaborate on projects for which they share a passion



# Principle 5: Co-create value with prosumers (2)

- Customers will come up with great new uses/applications for your product that you never imagined
- Example: IKEA created [ikeahackers.net](http://ikeahackers.net)
- One innovation of thousands: Grundtal toilet roll holder converted to headphone hanger
- Give these customers a forum for sharing these ideas, and then pay attention



# Principle 5: Co-create value with prosumers (3)

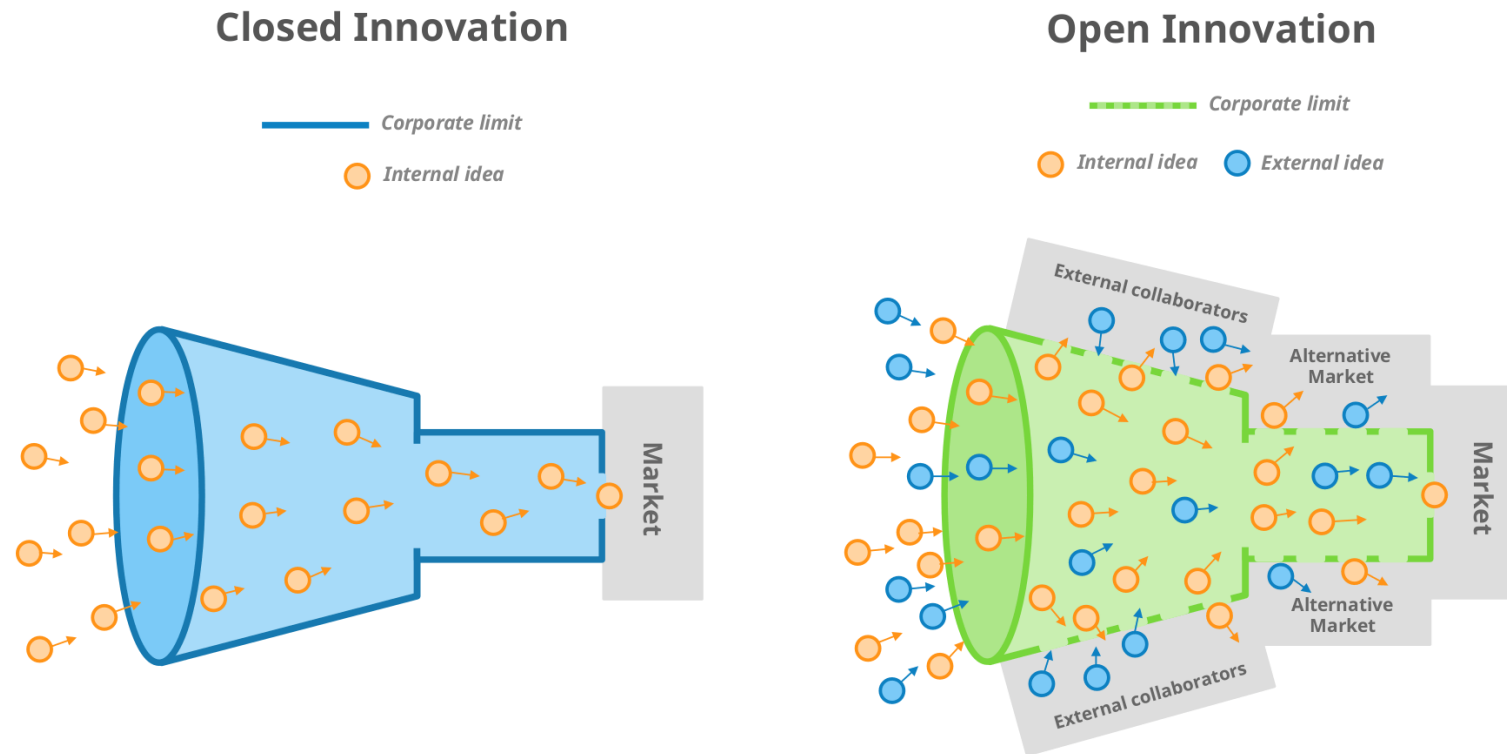


Translating this to the resource and energy sectors:

- How can you **democratize** your innovation processes?
- “Hackathons” are already happening, but can you go further?

# Principle 6: Make innovative friends (1)

- Open innovation



Source: <https://www.viima.com/blog/open-innovation>

# Principle 6: Make innovative friends (1)



- Open innovation as a two-sided coin:
  - 1) What innovations are being created by other organizations, industries, etc. that you could be using?
  - 2) What innovations are you creating that could be monetized in other sectors?
- Don't just protect your intellectual property—***monetize*** it!



# Thank you!



## Questions?

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