

# Storage Business Models: Lessons for Electricity from Natural Gas, Cloud Data and Frozen Food

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# About this paper

## Aim

To explore well established non-electricity storage markets in order to identify some key lessons applicable to the electrical energy storage (EES) operated by distribution electricity firms

## Selection of non-ES markets

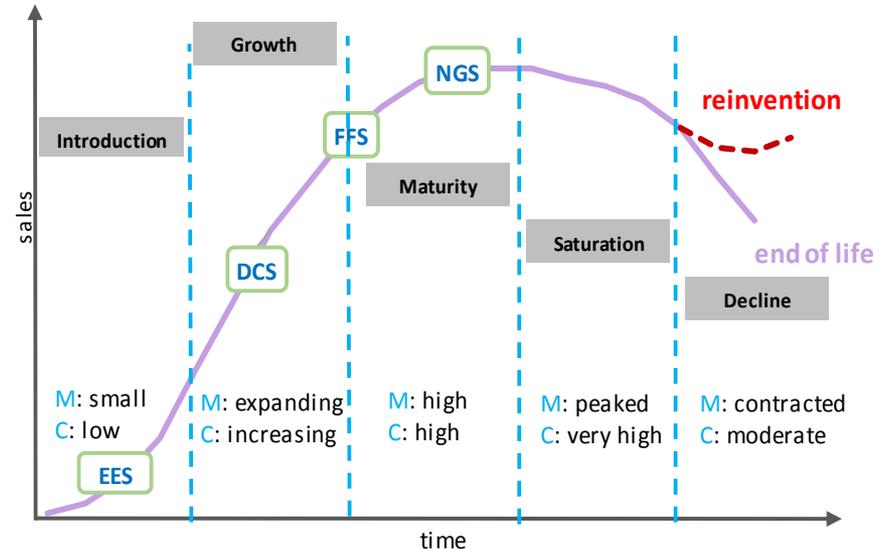
Markets in different stages of lifecycle:

- Cloud data (growth stage): [Google Drive](#)
- Frozen food (between growth&mature stage): [Oakland International](#)
- Natural gas (mature stage): [Centrica Storage](#)

## Methods

- Interviews
- BM methodology

Fig. 1: Lifecycle of EES and other non-electrical storage markets



M: market, C: competition. Source: Fourquadrant (adapted).

# Business Model Methodology

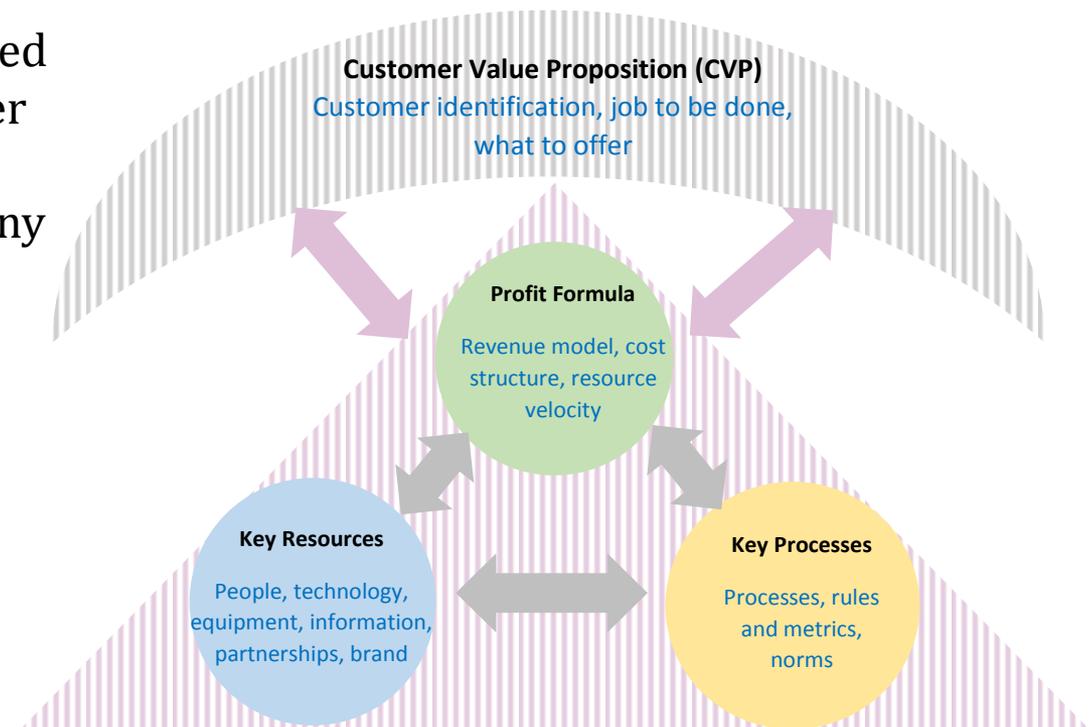
- BM methodology based on Johnson et al. 2008
- Identification of four interlocking elements:

**CVP:** services/products to be offered to customers, value to the customer

**Profit formula:** the way the company captures the value

**Key resources/processes:** help to deliver the value (customers&companies)

Fig. 2: Business Model Components



Source: Johnson et al. (2008), adapted.



# Non-Electrical Storage Experiences

<u>Natural Gas Storage</u>	<u>Frozen Food Storage</u>	<u>Cloud Storage</u>
<ul style="list-style-type: none"> <li>• To be worth: US\$763.6 b by 2019, with underground SC of 16.2 trillion cb. feet.</li> <li>• Market leaders: USA (1st): 4.8 tr.cb.feet, EU: Germany, France, Italy (52%)</li> <li>• Ownership: multiple options depending on regulation (EU vs USA)</li> <li>• Type of products: physical and virtual gas storage, SBU/unbund.</li> <li>• Allocation methods: auctions (reserve prices, multiplier), bilateral, mandatory (EU countries): 3% (Czech R. ) to 24% (Hungary)</li> <li>• Main concerns: Lower utilisation rate Decline in seasonal spread/short term price volatility Underrate: flexibility, security of sup.</li> </ul>	<ul style="list-style-type: none"> <li>• Frozen food global sales: US\$297b (2019), 3.9% CAGR (2013-2019)</li> <li>• Global cold storage capacity 600 m.cb.metres (2016) lead by India, USA, China In USA: public cold storage with 75% share (vs public)</li> <li>• Growth driven by: household income, supermarkets develop., transport infrastructure</li> <li>• Benefits: waste food reduction: global costs: US\$400b/year, 7% GHG, 3.3b ton/year</li> <li>• Type of products: storage only, and additional bundled services</li> <li>• Ownership: third party logistics, retailers, producers</li> <li>• Allocation methods: market forces (bilateral)</li> </ul>	<ul style="list-style-type: none"> <li>• Move to the cloud in imminent</li> <li>• Internet growth a key factor: Access (2016): 97% firms&amp;50% EU pop., 6.2b dev. worldwide</li> <li>• Cloud storage growth in line with public cloud data centres - PCDC PCDC: 70% total storage cap., traditional ones: 12% by 2020.</li> <li>• Security bridge a main concern in cloud storage</li> <li>• Cybersecurity costs: US\$6 trillion/year (up from US\$400 b/year in early 2015).</li> <li>• Type of products: fixed storage plans based on size of storage (GB, TB)</li> <li>• Ownership: dominated by IT private firms (Google, Dropbox, Microsoft, Apple, Amazon)</li> <li>• Allocation methods: market forces (bilateral)</li> </ul>

# Discussion of Non-Electrical Storage Experiences

## *Centrica Storage*

- About the company: Centrica (parent company), operates Rough Reservoir (largest in the UK), WC: 135.6 billion cb. feet.
- Regulation: national (OFGEM), regional (EC), specific undertakings (unbundling, third party access, etc.)
- Products: bundled (SBU), unbundled, firm/interruptible, long/short term. Types: S Store, C Store, V Store (virtual)
- Virtual gas storage: optimisation of I/W nominations against market prices
- Capacity allocation: bilateral/auctions/no mandatory allocation
- Main concerns: value of gas storage, spread seasonal prices (75% decrease between 2010/2015), technical issues (end of design life), as a result limited operation:
  - *SBU's sold: 340 million in 2016/2017, in comparison to 455 million in 2015/2016*
  - *gross revenues: £93 million, 40% lower than in 2015*



# Discussion of Non-Electrical Storage Experiences

## *Oakland International*

- About the company: Third party logistic operator (TPL) with supply chain solutions (cold storage, others) with operations in UK and Ireland
- Key figures: 34,000 pallet capacity, 1.2 million cases of food (week), 3,500 different products, 50 destinations.
- Ownership (cold warehouse): remains in Oakland with key refrigerated transport partners (40% provided by retailers). Transport is a very competitive market.
- Storage services: usually linked to bundled services (storage+distribution). Use of triangulate logistics (93% of utilisation of the fleet, savings: 90% of supply costs)
- Regulation: Subject to local (UK), regional (EU), international (Codex Alimentarius) regulation – product and storage infrastructure
- Storage charging: based on weekly number of cases per type of product (with consolidation benefits) regardless of destination.
- Sustainability: solar panels (750 KW for peak demand), energy efficiency, waste water management, electric cars (local mobility).

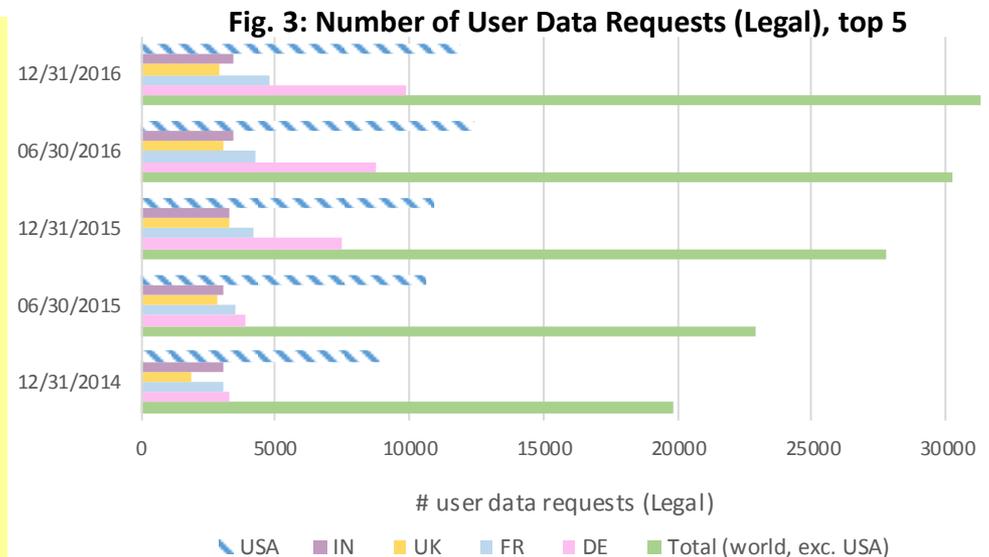
# Discussion of Non-Electrical Storage Experiences

## Google Drive (Software as a Service- SaaS)

- Released in 2012, worldwide data centres (15) owned/operated by Google, +800m users
- Storage services: individuals from 100 GB to 30 TB, business&companies 1TB/user
- Features: support different systems (MAC/android/IoS), languages (+150), files
- Storage plans: no regulated, fixed plans (monthly) with option of free storage (15 GW)
- Key partnership: developers for apps
- Sustainability: 100% renewable energy for its global operation (data centres) by 2017

### User data requests – legal (by governments)

- Due to regulatory violations (i.e. cybersecurity)
- USA and Germany lead the number of user data legal requests, followed by France, UK
- USA and the UK the ones with the highest % of legal requests that Google accepted to produce some information, 80% and 71% respectively between 2014/12 and 2016/12



Source: Google raw data user requests (Transparency Report)

# Conclusions

- Well developed business models already exist in growing and mature and storage product markets.
- It is key that the BM provides a value proposition to customers, can generate profit for the company and that the company has the resources to make this possible.
- All storage products are sensitive to regulation, especially EES.
- Ownership of storage facilities is an important part of their BMs, restricting this arbitrarily may be bad for the development of EES.
- There has been a lot of innovation in storage BMs, especially in technology and in contracting (bilateral and market), which should be facilitated in EES (i.e. blockchain).
- The Internet of Things and digitalisation would play an important role on the democratisation and accessibility of EES products.

Q&A

Thank you