

**TASNEE** التمنية

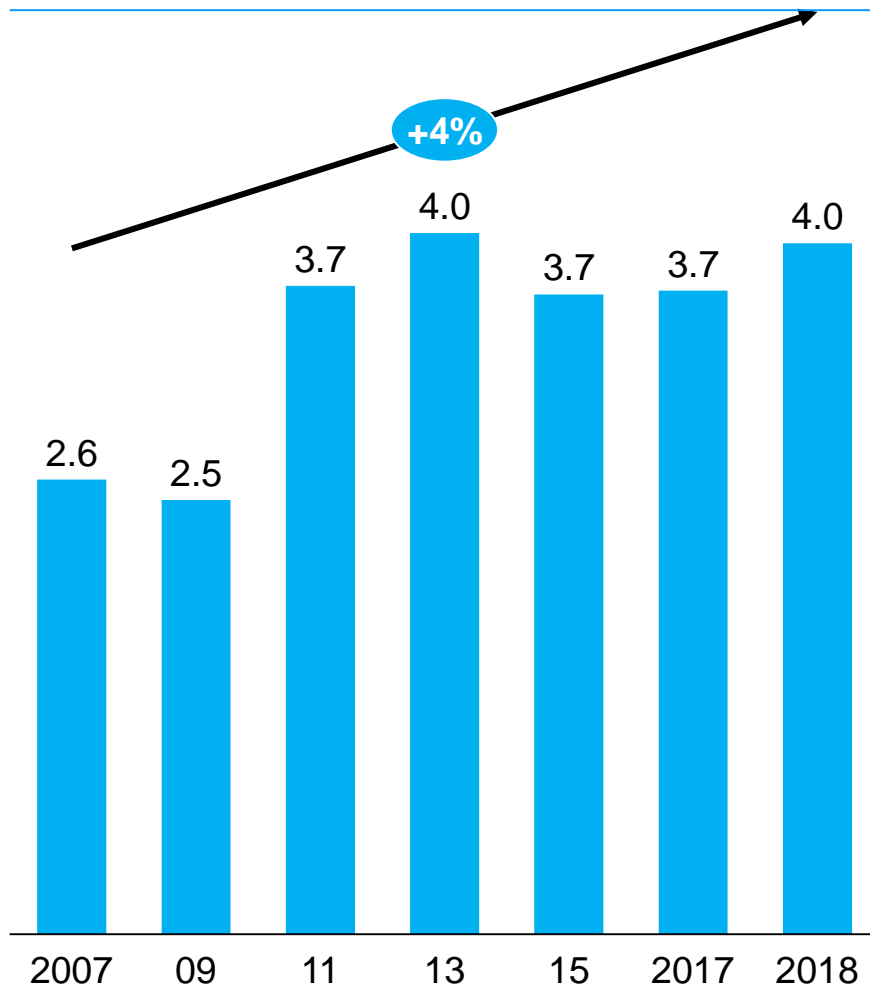


**Petrochemicals in Alberta from an international investor's perspective**

# Today, the size of the chemicals industry is USD ~4 trillion, with Asia and GCC (Middle East) driving growth over the past decade

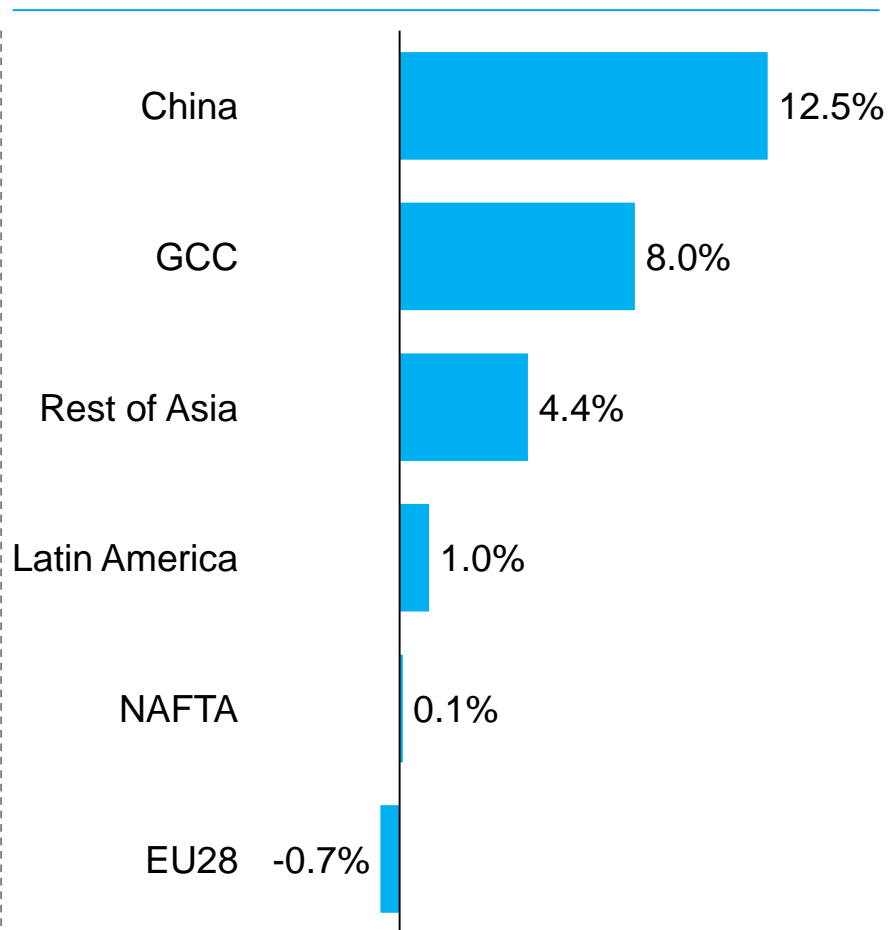
## Global chemicals revenue

USD trillion



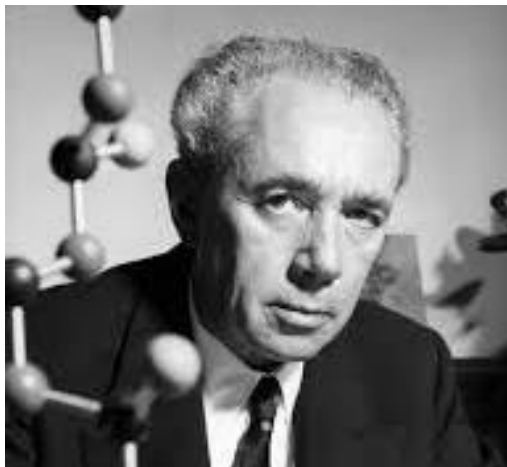
## Chemicals revenue growth by region

% CAGR 2007-2018



# Chemical industry stands on three pillars: unique technology, advantageous feedstock and growing demand

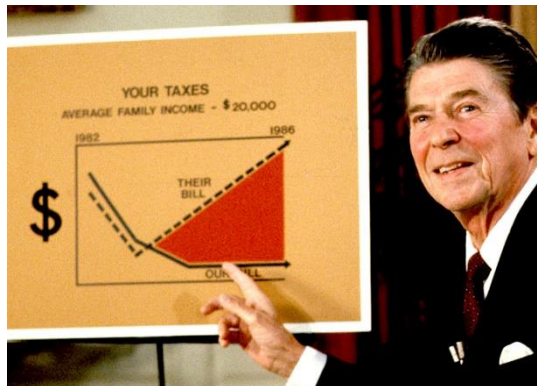
## Germany



- In 1909, Haber-Bosch invented ammonia production process
  - World War I munitions
  - Fertilizers
- In 1925, Fischer and Tropsch invented process to liquify coal
- In 1950s, Ziegler and Natta invented polymerization catalysts

Technology

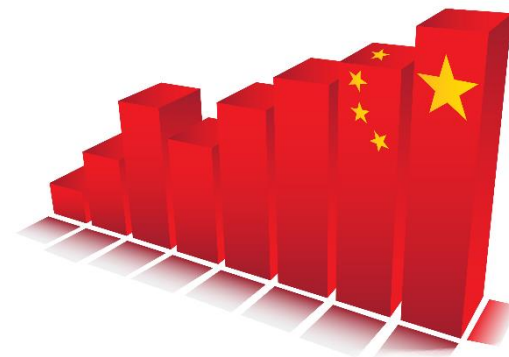
## Middle East and North America



- Ronald Reagan deregulated the US oil and gas industry in the early 1980s
  - Led to massive growth in supply and infrastructure
  - Enabled petrochemical investments

Advantageous feedstock

## China



- Chemical market in China has been growing at ~14% p.a. for last 20 years
- In next 10 years, China will provide ~50% of total global chemical demand growth
- China is also home to the coal-to-olefins technology, enabling feedstock advantage in China

Growing demand and coal-to-olefins (CTO) technology

# Feedstock advantage is “king” among the three pillars of the chemical industry... accounts for ~60% of global EBITDA pool

## Petrochemical value pools<sup>1,2</sup>

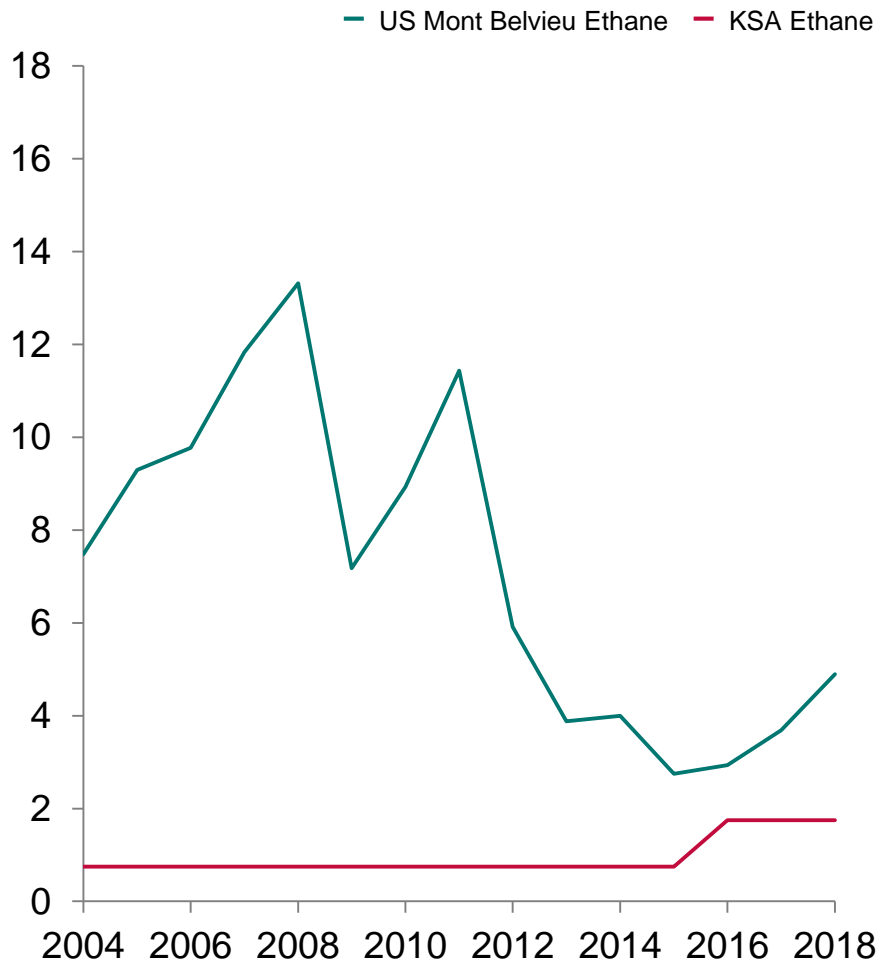
EBITDA USD Bn, 2013-2015 weighted average

Feed-stock	Building blocks	First level	Intermediates	Final products					
Coal Natural Gas NGL <sup>4</sup> LPG Naphtha Gasoil	C1	30	Ammonia Methanol	5	Urea, VAM, Acetic Acid	1.2	POM	0	36
	C2	42	Ethylene	19	EO, MEG, LAO	2.4	PE, PVC	5.5	69
	C3	2.6	Propylene	2.6	PO, Acrylics, MMA, ACN, ECH	8.0	PP, ABS	4.4	18
	C4	0	Butadiene, Butene	1	MMA	0.1	PBR, SBR	0	1
	Aro-matics	0	BTX <sup>5</sup>	3.6	PX, PTA, SM, TDI, MDI, Phenol	0.2	PS, ABS, PET, PC	0.2	4
		74	31	12	10	127			
	<b>Feedstock advantage<sup>3</sup></b>	<b>Stand-alone value contribution</b>			<b>Total</b>				

# Price of gas feedstock in Saudi Arabia has been significantly lower than the rest of the world e.g., the US, although the gap has been closing

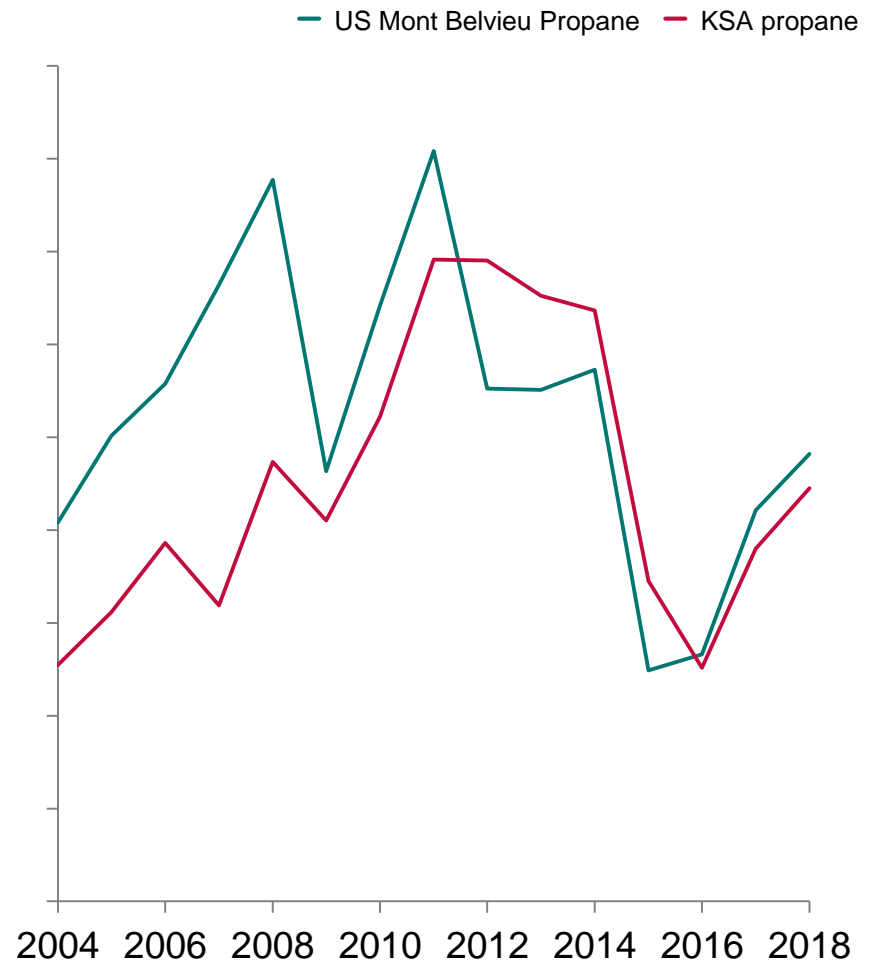
## Ethane price advantage in Saudi Arabia

USD per mmBtu



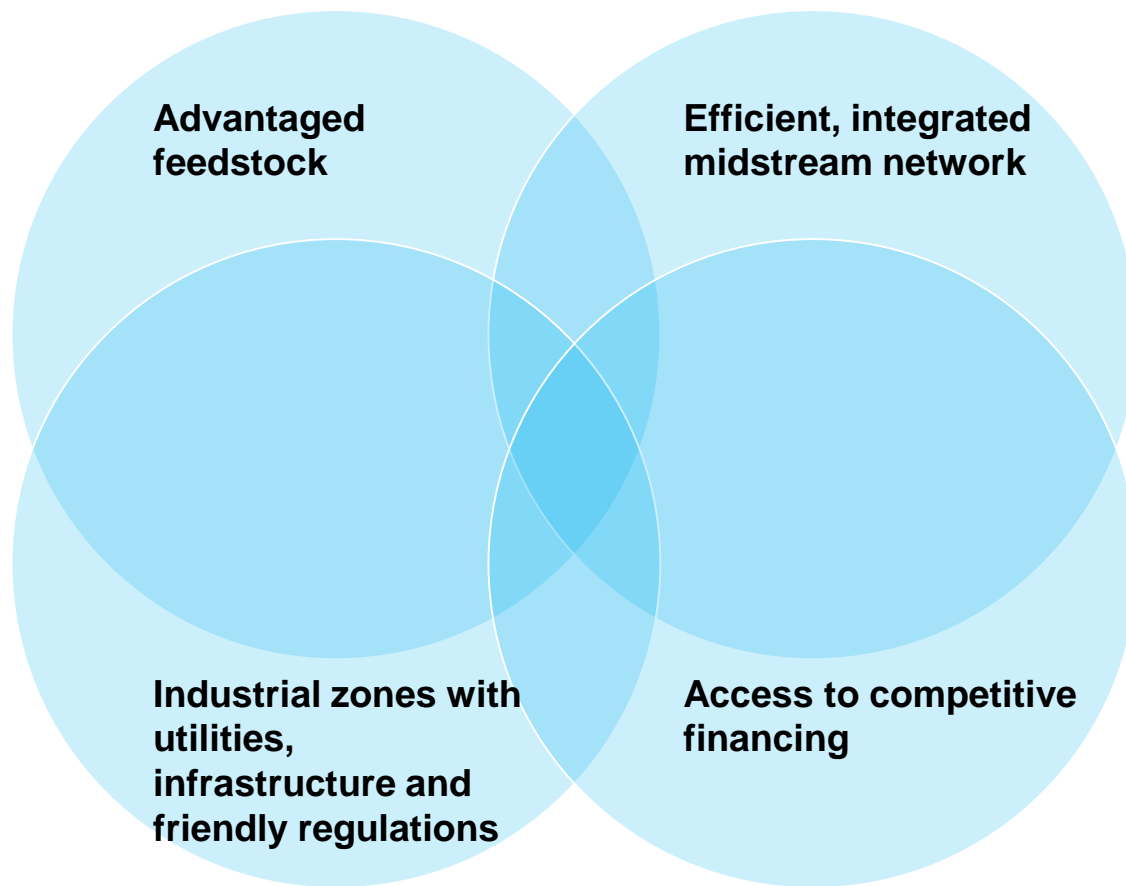
## Propane price advantage in Saudi Arabia

USD per mmBtu



## **Advantaged feedstock alone is not enough... four key elements need to come together to translate feedstock advantage into major investments**

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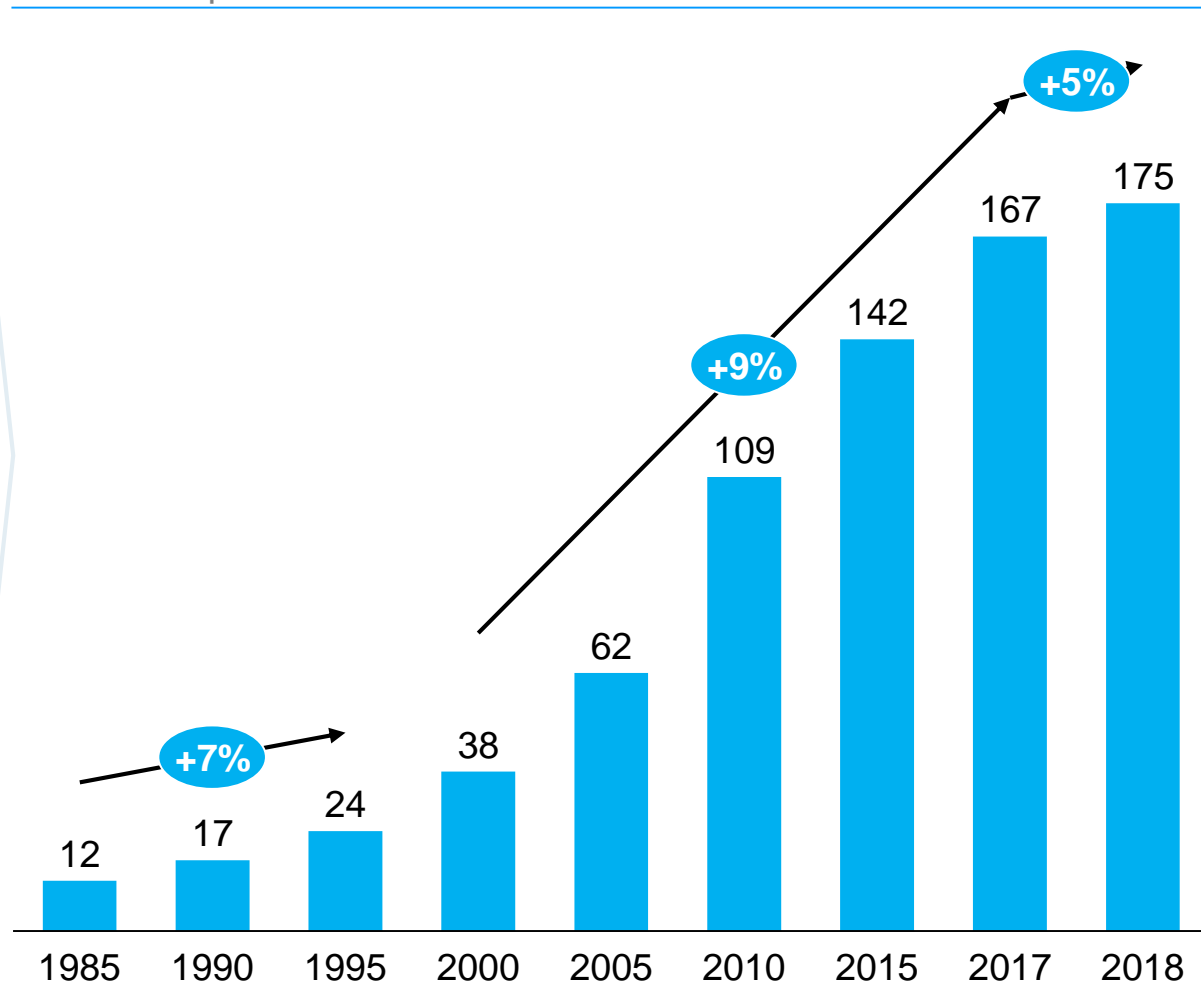
# In the late 90's, GCC regulators put in place a number of key enablers that unlocked the growth potential of the region in the period 2000-2017

## Enablers put in place in GCC

- **Master gas project** in the late 1970s, enabling access to feedstock
- Clear regulatory framework and process for **feedstock allocation**
- Development of dedicated **industrial cities** with their own authorities, industry-friendly processes, **infrastructure** etc
- Access to **competitive project financing** through government funding agencies

## GCC petrochemical industry production capacity

Million tons per annum



# If feedstock advantage is combined with other enablers, Alberta could attract USD 5-6 Bn PER YEAR, compared to USD 6-7 Bn over last 20 years

## Global polyolefin<sup>1</sup> demand

~175 million  
tons per  
year

## Annual demand<sup>1</sup> growth

~4% p.a.  
OR  
~7-8 million  
tons per  
year

## New investments needed to meet global demand

4-5 plants OR  
US\$ 20-30  
Bn per year  
until 2030

## World investment in petrochemicals<sup>2</sup> since 2000

US\$ ~400  
Bn

## Alberta investment in petrochemicals<sup>3</sup> since 2000

US\$ ~6-7  
Bn

1. Polyethylenes and polypropylene
2. Ethylene and Propylene: US\$ 210 Bn; Polyethylenes and Polypropylene: : US\$ 190 Bn
3. Includes estimated spend to date for projects under construction



## In summary, Alberta has all the necessary fundamentals to be a leader in petrochemicals, and requires certain key enablers

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- Advantaged feedstock is the single most important value creation lever in the petrochemical industry, and **Alberta is one of the most advantageous locations**
- **Alberta's Industrial Heartland (AIH) serves a critical need for investors**
- As a foreign investor, some of the **main hurdles include:**
  - **High CAPEX required** to build a true greenfield investment, particularly in terms of **infrastructure and utilities**
  - Coordinating across a wide range of midstream (and sometimes even upstream) players and assets
  - Navigating the **regulatory environment**
  - **Taxes**
- **Petrochemical industry could prosper in Alberta** with sufficient coordination across the oil and gas supply chain, as well as with certain government initiatives

**THANK YOU**

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