Novo Mercado de Gás

PowerHaus

# Underground Gas Storage

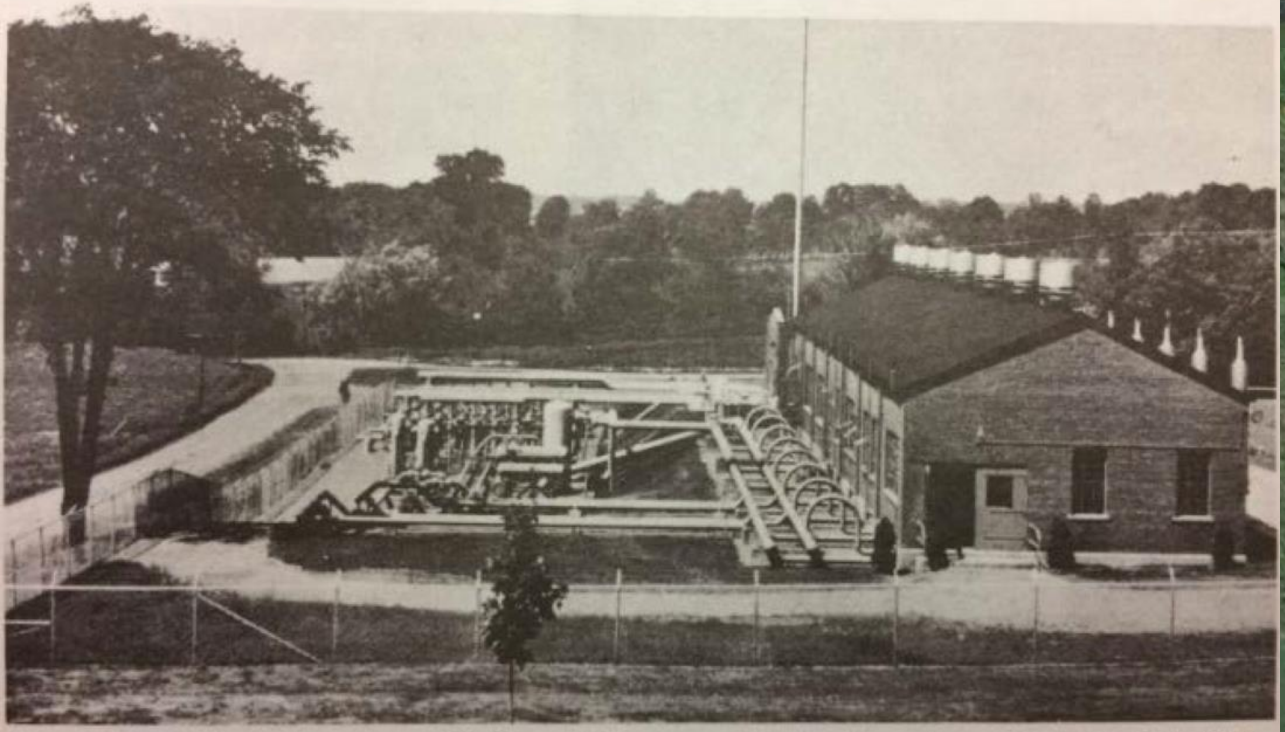
## The requirements to develop one of Gas Market's key activities in in Brazil

Perspectives of a Developer

Brasilia, October 23rd

**IEA Brazil Gas Workshop 2019**

# FIRST UGS IN THE WORLD, ZOAR FIELD IS STILL OPERATING

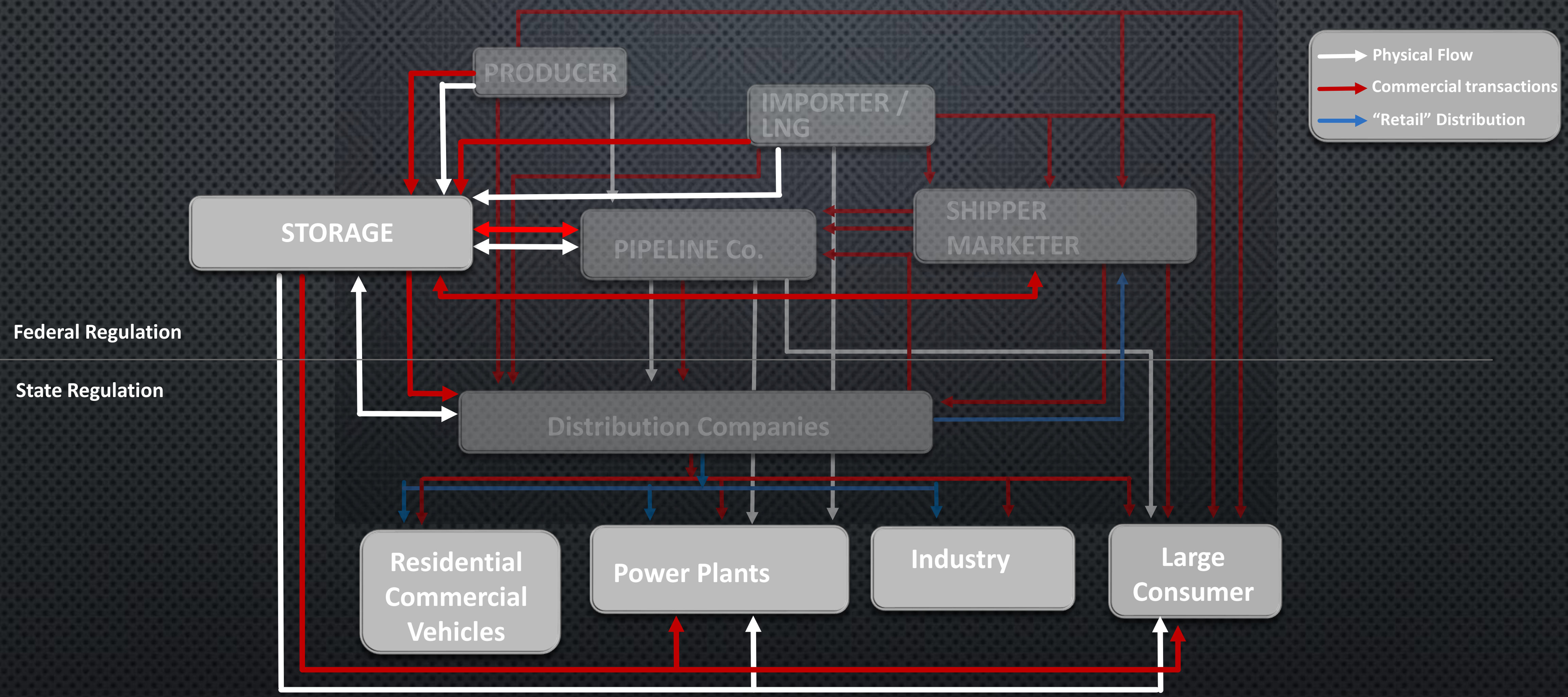


Above: 1916 – Zoar Compressor Station which pumped natural gas to and from Nation's first underground storage field.

FLEXIBILITY

STORAGE = +

RELIABILITY



Physical Flow
Commercial transactions
"Retail" Distribution
PRODUCER
IMPORTER / LNG
STORAGE
PIPELINE Co.
SHIPPER MARKETER
Federal Regulation
State Regulation
Distribution Companies
Residential Commercial Vehicles
Power Plants
Industry
Large Consumer


## Stogas

- Started in 2006
- Screened opportunities in salt and depleted fields

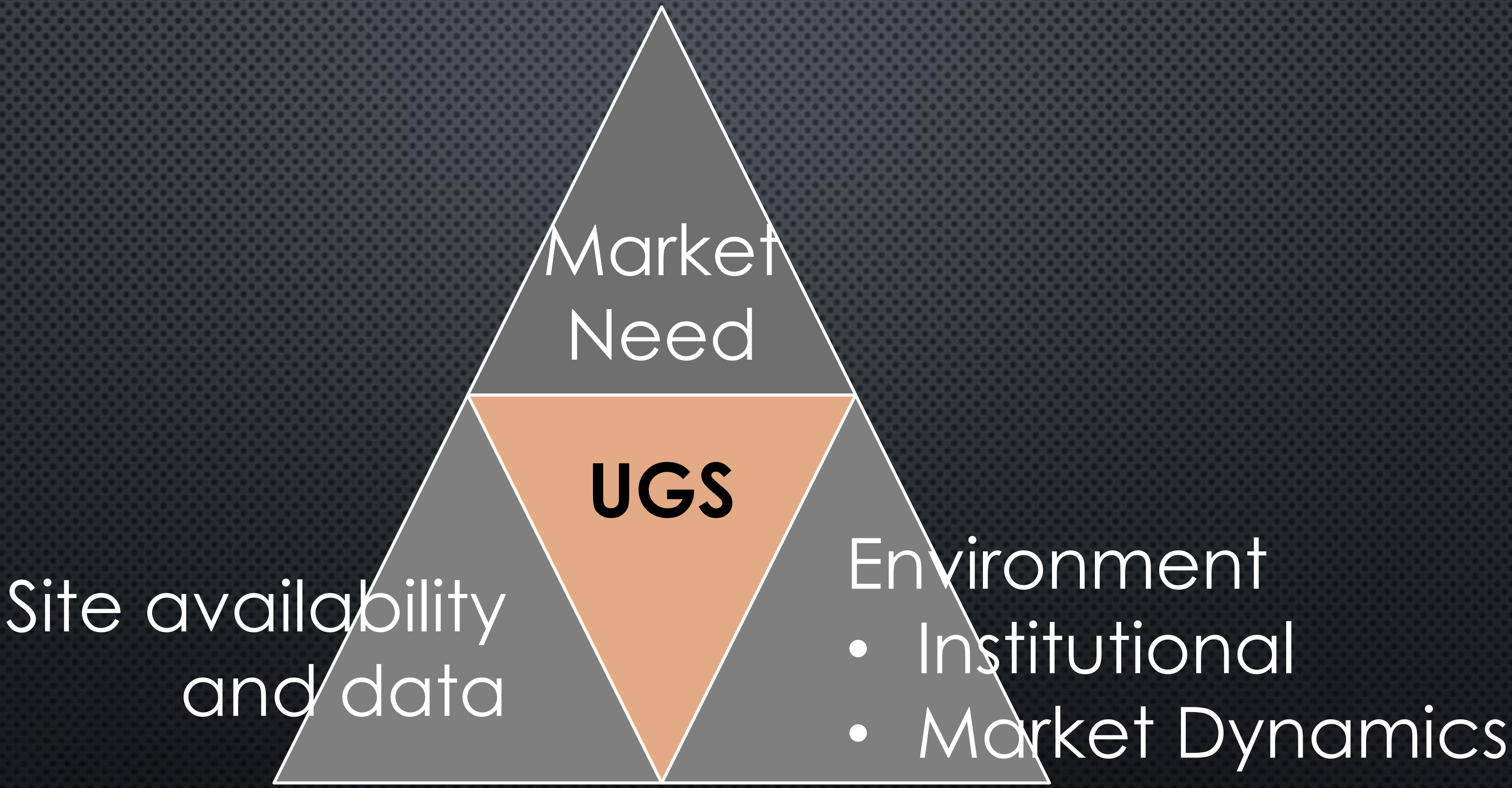
## Santana Gas Storage Project

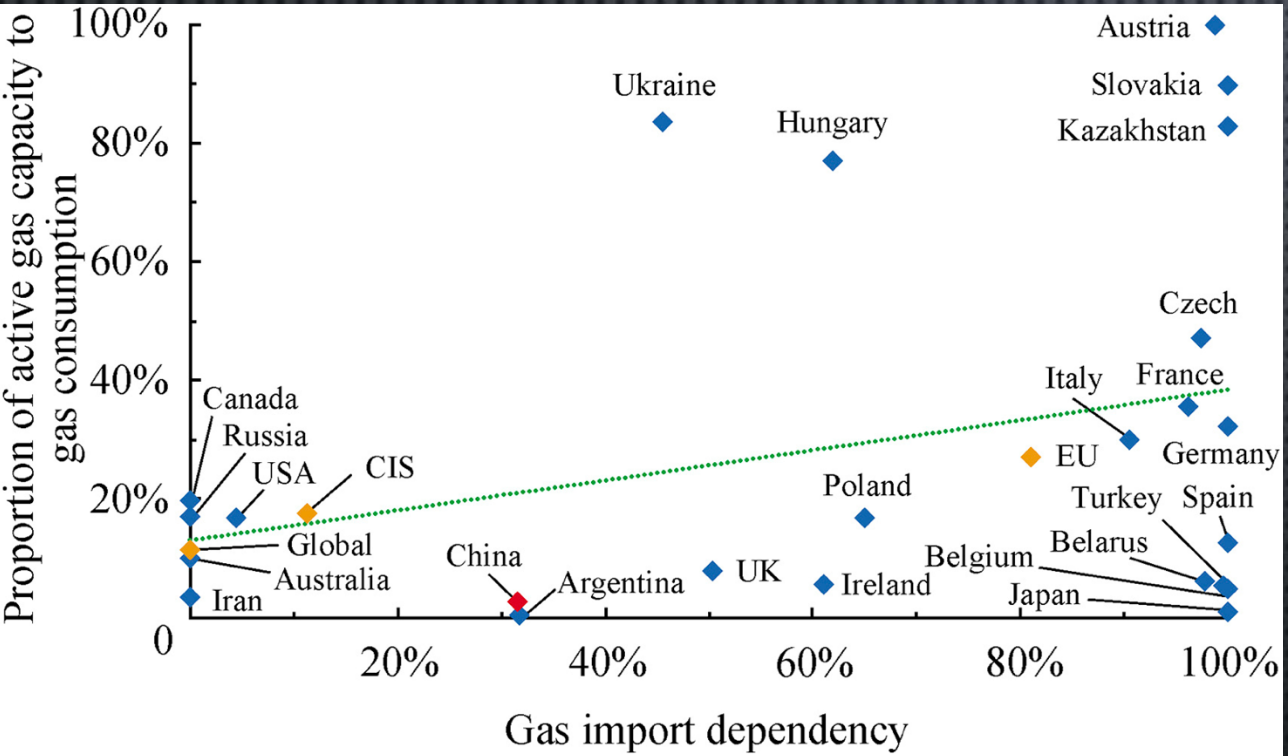
- Depleted oil & gas field that has been producing since 1962

- 15 Km from Catu Compression Station

- Storage project design started in 2011
- ANP Authorization in 2015

- Up to 170 Million cubic meters WG
- 1-2 million cubic meter/day injection/withdrawal


Market Need
UGS
Site availability and data
Environment
• Institutional
• Market Dynamics




Source: EPE 2018

Average WG / Total Annual Consumption in more advanced markets:

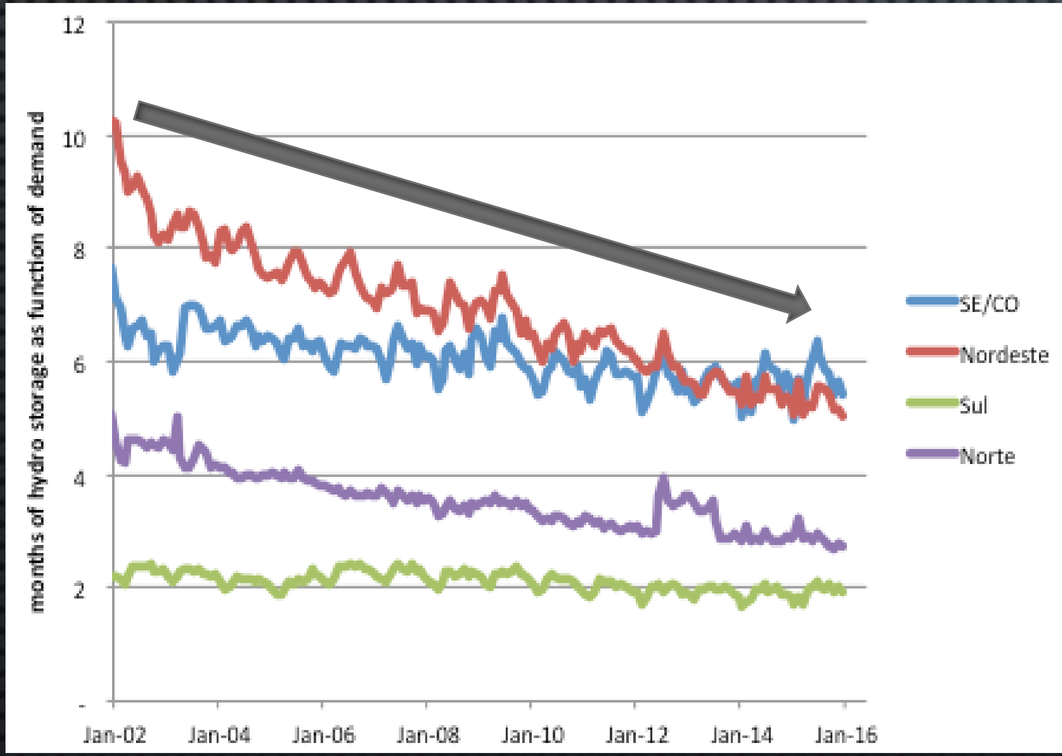
5% - 30%

Brazil demand 80-90 MMm3/d
~ 30 billion m3 / year

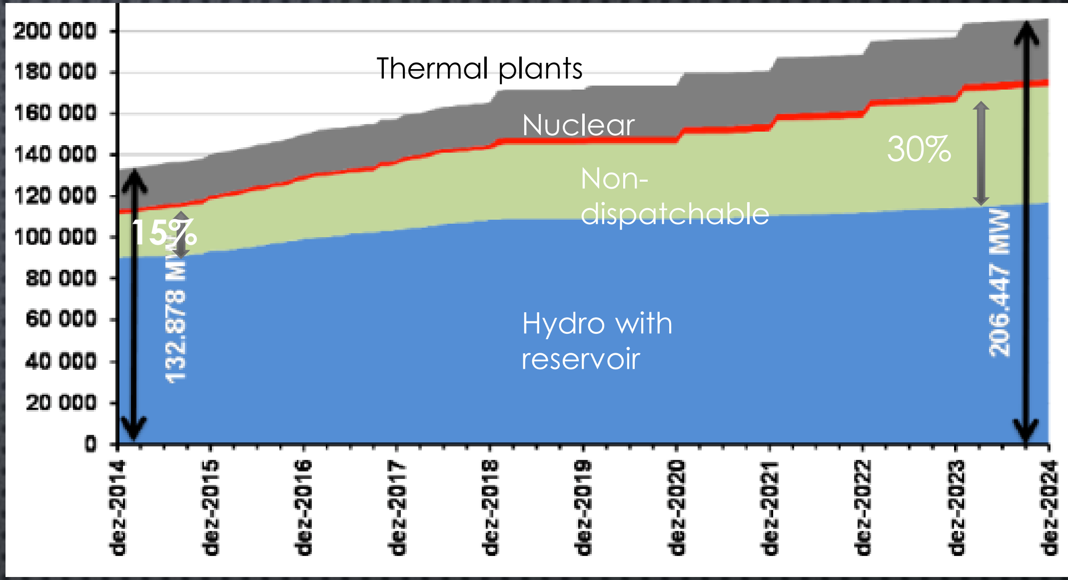
EPE 2026: demand 80-130 MMm3/d
~ 38 billion m3 / year

1.5 – 9 billion m3 WG ?

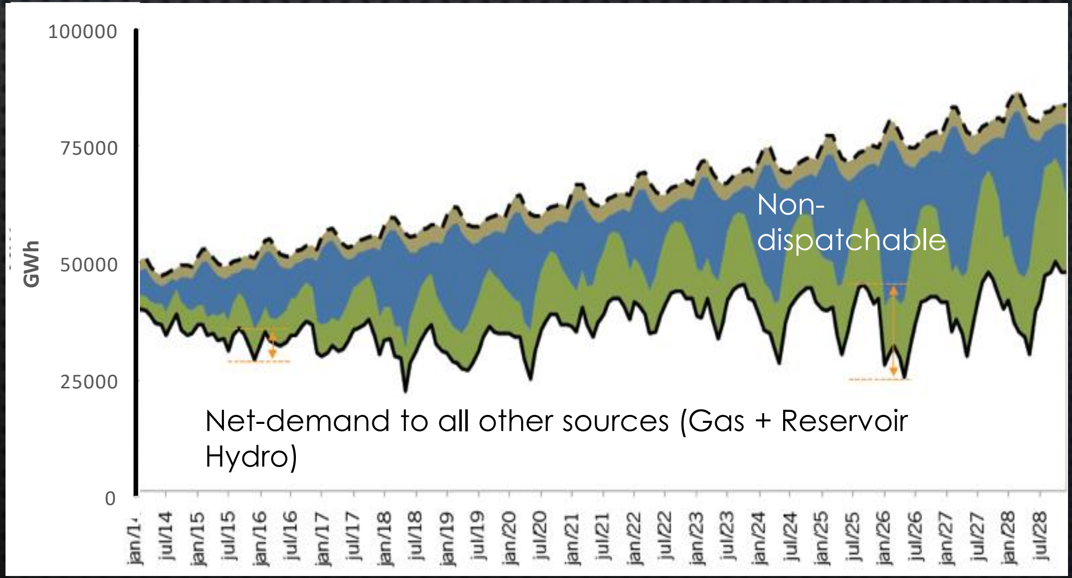
## Months of demand stored by hydro reservoirs




## Development of installed capacity

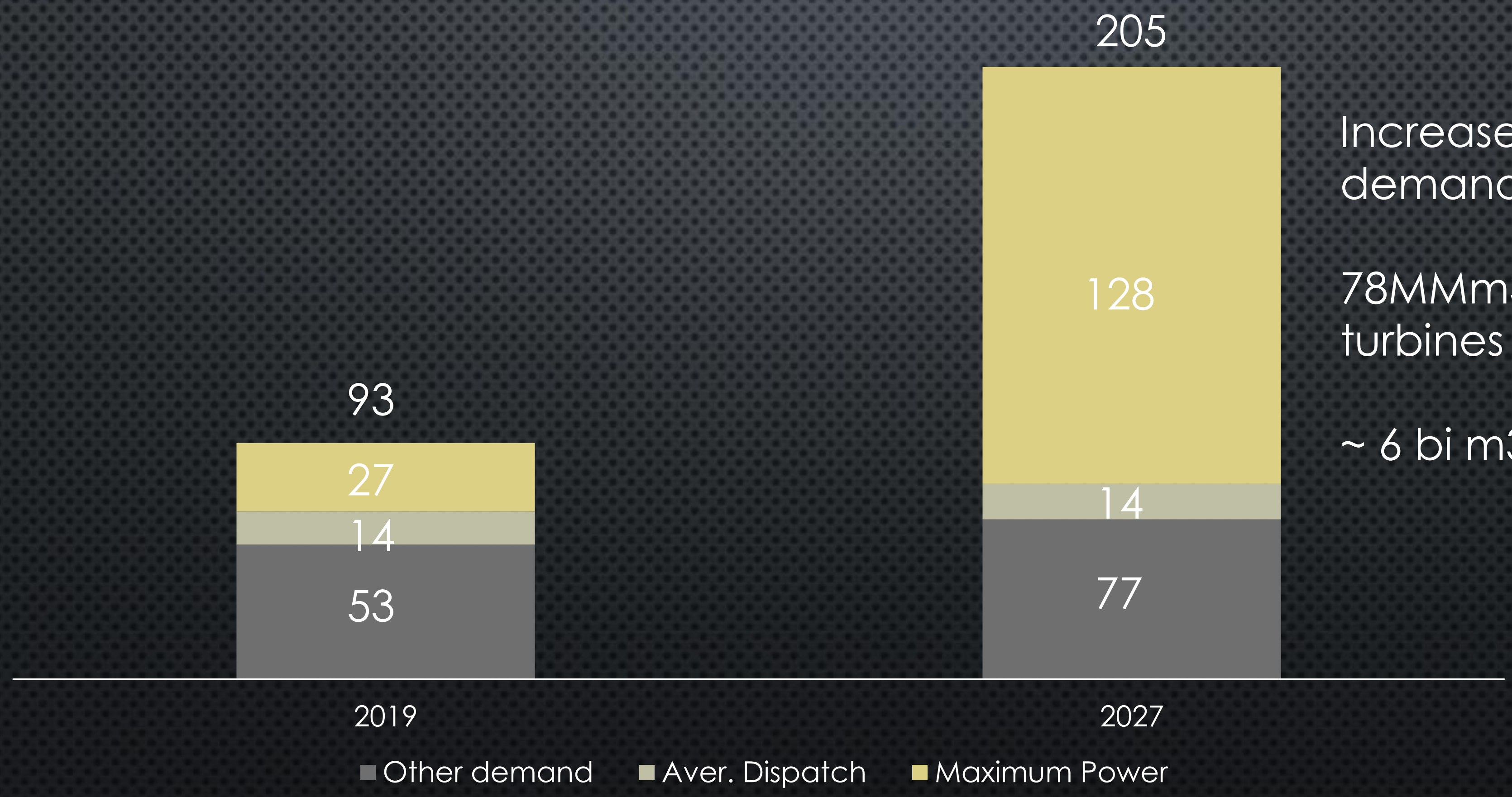



## Evolution of total demand and net demand to dispachable sources




Data source: EPE

## Projected gas demand (MMm3/day)

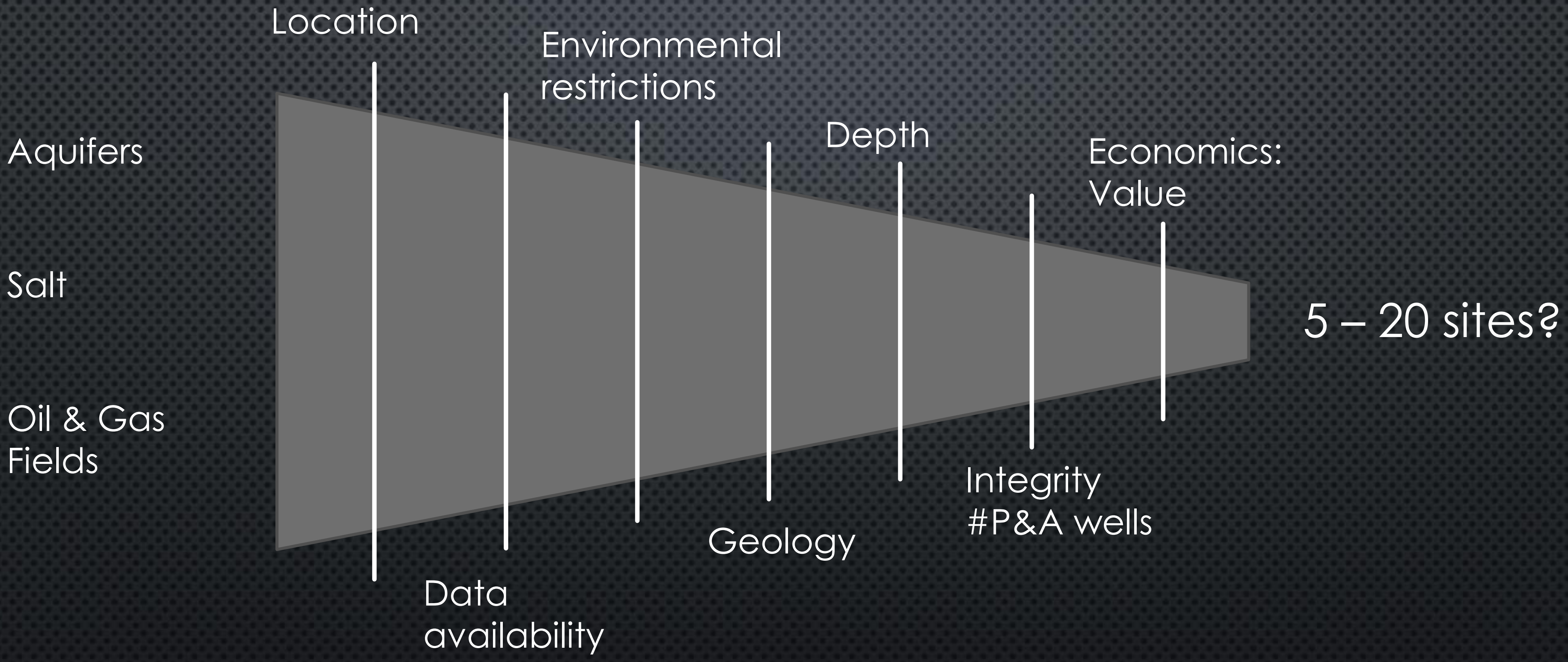



Increase mostly in flexible demand

78MMm3/d of open cycle turbines

~ 6 bi m3 of storage?

Source: EPE 2027 Decenal Plan


Aquifers
Salt
Oil & Gas Fields
Location
Data availability
Environmental restrictions
Geology
Depth
Integrity #P&A wells
Economics: Value
5 – 20 sites?

# LEAST BUT CRITICAL: BUSINESS ENVIRONMENT

Institutional

- Gas Law (10 years…)
- Gas para crescer
- PL6407/**<u>2013</u>**
- ANP Res.17/2015 !

+

Market Dynamics

- Ownership
- Access
- Network & storage code
- Transparency
- Power Sector !

## Era of Regulation: 1950 - 1970's

- Concern about monopoly power
- Federal, state and local regulations
- Significant market growth
- Gas still considered an oil by-product

www.eia.doe.gov Energy Information Administration

## Era of Market Inefficiency: late 1970's - mid 1980's

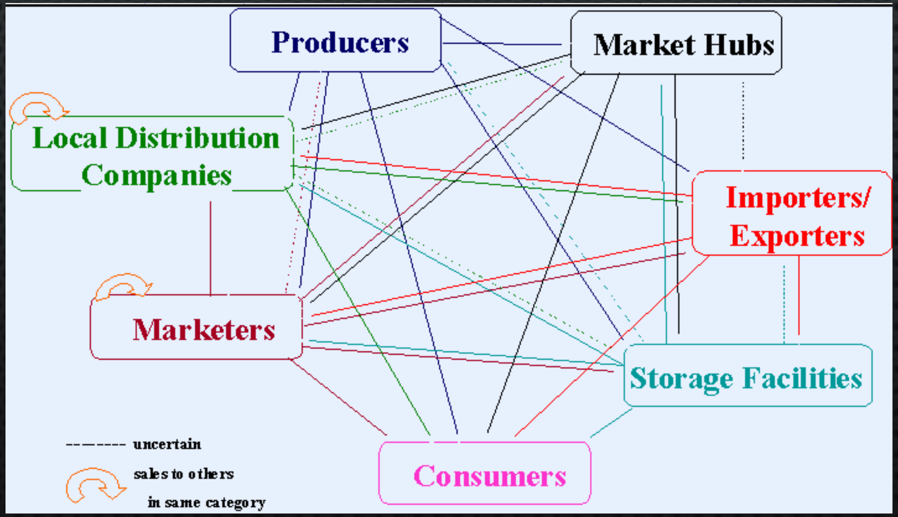
- Market signals not transmitted - prices not market driven
- Curtailments, followed by market restrictions
- Growing perception of supply scarcity, then supply "bubble"
- Disincentives to efficiency improvements

www.eia.doe.gov Energy Information Administration

## Era of Adjustment/Restructuring/Deregulation: late 1980's - 2000

- Period of transition - policy and market changes
- Wellhead prices deregulated - spot, futures markets develop
- Restructured transmission industry - emergence of marketers
- Market centers, hubs, storage expand
- Retail Market regulatory changes

www.eia.doe.gov Energy Information Administration




Source: EIA 2000

UGS

anp
Agência Nacional do Petróleo, Gás Natural e Biocombustíveis

# Pontos para Debate
# Gás Natural / Geração Termelétrica

Storage

- Qual a participação ideal da geração termoelétrica para garantir a oferta de energia elétrica a fim de evitar riscos de déficit de energia? Qual a participação ideal da geração termoelétrica a gás natural ? ✓
- Apesar das vantagens locacionais das usinas termelétricas (podem ser instaladas próximas aos centros de carga), como resolver questões relativas ao meio ambiente (emissões, uso da água)?
- Como resolver as questões contratuais que perpassam os setores elétrico e gasífero? Dificuldades de harmonizar cláusulas tipo take-or-pay de contratos de gás com otimização hidrotérmica do sistema elétrico; ✓
- Como contrabalançar os preceitos de modicidade tarifaria e novos investimentos no setor elétrico, com a perspectiva de garantir oferta de gás natural para geração termelétrica com preços que tendem ser mais elevados (projetos de interligação dutoviária e empreendimentos de GNL)? ✓
- Como otimizar o dimensionamento dos projetos de infraestrutura dutoviária de gás natural, a partir da consideração de termelétricas à gás natural que nem sempre são despachadas? ✓
- O sadio desenvolvimento da indústria gasífera nacional deve estar calcada somente com o crescimento da geração elétrica a gás natural? E o segmento industrial? ✓

Source: ANP, Presentation of José Cesário Cecchi, "Interface das Industrias de Gás e Energia Elétrica", V Congresso Brasileiro de Regulação, 9 maio 2007, UGS

# Institutional Points of attention

- PL6407
  - Art. 5: remove storage?
  - Art. 7: pipeline classification (integral part of facility)
  - Art.22: “exclusivity”?
  - Art.23: ok but difficult to define base gas
- ANP
  - Should lead through regulation
  - Technical and commercial oversight
  - Entry/exit tariff for storage
  - HSE requirements: well design, abandonment, monitoring
  - Spec: water dew point @-39C?
- Other
  - Access to transport network
  - Taxation
  - **Power Sector Reform and harmonization**

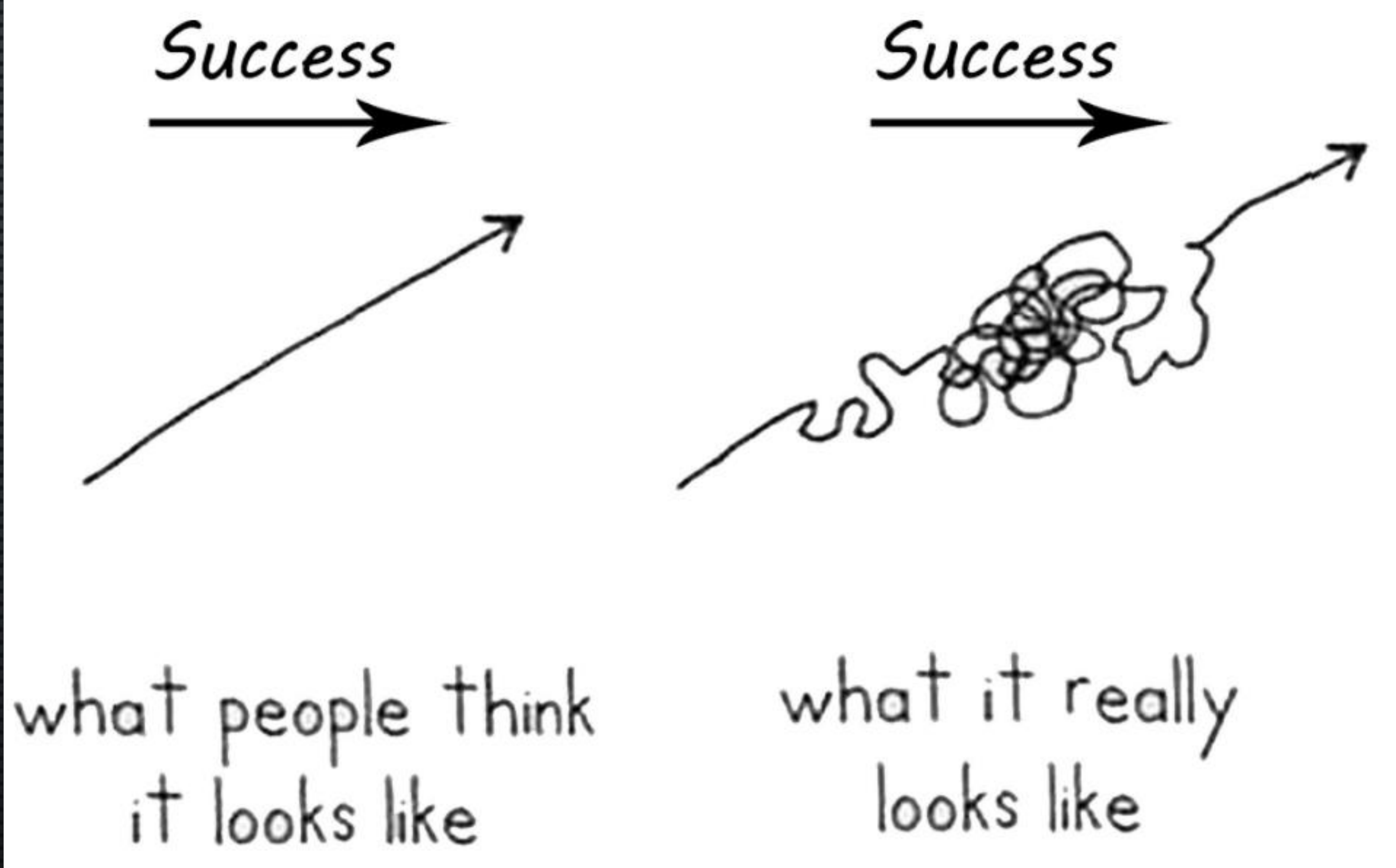
# Market Dynamics (some) Points of attention

- Regulatory and market design with rights incentives for coherence in "risk allocation”
- TPA and unbundled services

- Hubs and market places
- Liquidity and number of players (to include large consumers)

- Real "prices" in the power market: needed for gas to be appropriately priced in time
- Interest rates

- Market oversight


Success
Success
what people think it looks like
what it really looks like

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