Developing LNG and Gas-to-Power Projects in Brazil

Tauil & Chequer Advogados in association with Mayer Brown

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November 2017

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TAUIL·CHEQUER

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CHAMBERS UK

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Overview

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Session 1

-Navigating Brazil's opportunities for investment in gas and power projects

-Understanding Brazil's proposed new legal framework for the gas and power industries

Session 2

LNG

Power

Shipping

Regas

Gas Industry Institutional Structure

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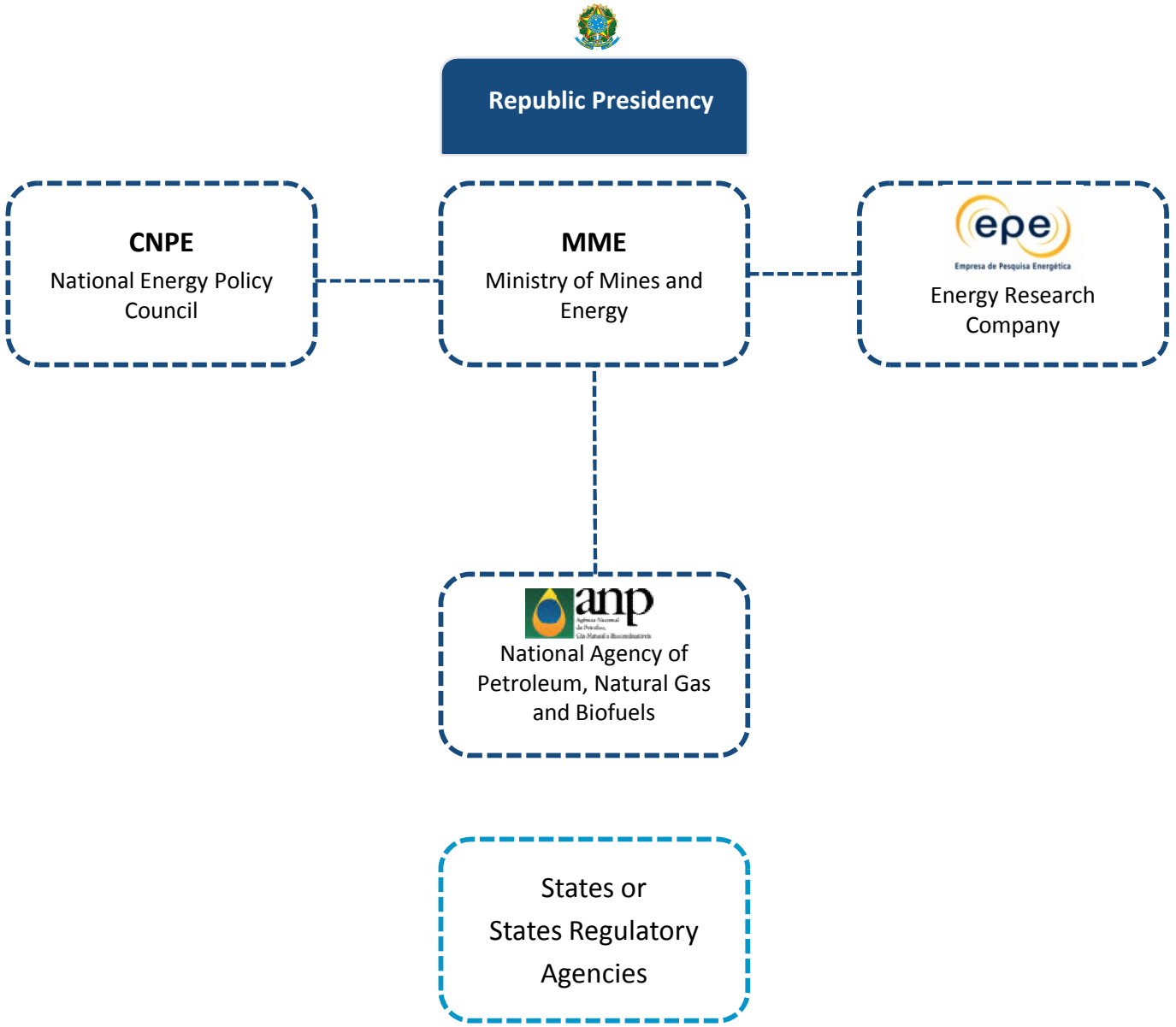
Federal

Policy

Regulation

State

Policy & Regulation



Federal x States Jurisdiction over Gas Activities

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Federal	Upstream	Exploration & Production
	Midstream & Downstream	Importation & Exportation
		Storage
		Processing
		Liquefaction & Regasification
		Transportation
		Shipping
		Marketing
State	Downstream	Distribution

anp
Agência Nacional do Petróleo, Gás Natural e Biocombustiveis

arsesp agência reguladora de saneamento e energia do estado de São Paulo
AGENERSA agência reguladora de energia e saneamento básico do rio de janeiro
AGERBA
Arpe Agência de Regulação de Pernambuco
...

Federal Gas Regulatory Framework

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FEDERAL LEGISLATION

2009 2010 2017

Gas Law (Law No. 11,909/09) regulates the processing, storage, liquefaction, regasification and trade of natural gas

Gas Decree (Decree No. 7,382/2010) regulates specific aspects of Gas Law

GAS TO GROW

IMPROVEMENTS TO THE GAS LAW AND GAS DECREE

FEDERAL REGULATION

2011 2012 2013 2014 2015 2016

ANP Resolution No. 50/2011 - construction and operation of LNG terminals and pipelines

ANP Resolution No. 51/2011 – register of self-producer and self-importer

ANP Resolution No. 52/2011 – authorization for gas trading

MME Ordinance No. 232/2012 - authorization for gas importation

ANP Resolution No. 42/2012 - sharing of oil, gas and biofuels pipelines

ANP Resolution No. 37/2013 – gas pipeline capacity expansion

ANP Resolution No. 51/2013 – authorization for the gas carriers

ANP Resolution No. 15/2014 – tariff criteria for transportation pipelines

ANP Resolution No. 52/2015 - construction, expansion and operation of LNG terminals and pipelines

ANP Resolution No. 11/2016 – third party access to gas pipelines, gas capacity assignment and gas swap

ANP Resolution No. 40/2016 – gas transportation information to ANP

States Gas Regulatory Framework

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STATES' LEGISLATION – GAS DISTRIBUTION SERVICES

FEDERAL LEGISLATION

1995 | 2009 | 2010

Federal Constitution Amendment No. 5/1995 allows States to delegate gas distribution services to concessionaires

→ **Federal Constitution, art. 25, § 2º:**
States must perform directly or through concession the local piped gas distribution services

Gas Law (Law No. 11,909/09)

Gas Decree (Decree No. 7,382/2010)

Self-producer, self-importer and free consumer

STATES' CONCESSIONS

1991 | 1997-1999 | 2000 | 2017 | 2018

Execution of Gas Distribution Concession Contracts

Privatization of Rio de Janeiro and São Paulo's Gas Concessionaires

CEG | gasNatural | CEG RIO | comgas

Public Bid for New Gas Concession in São Paulo

gasNatural fenosa

Studies for Privatization of 9 States' Gas Concessionaires

Privatization Process expected to 3Q 2018

Different Tariff and By-pass Regulations among the States →

Verticalized Monopoly Structure

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Petrobras used to have 95% of the gas market share

Upstream

PETROBRAS
(Natural Gas E&P)

Midstream

PETROBRAS
(LNG Terminals and Processing Plants)

TAG
NTS and NTN
TBG TSB
(Gas Transportation)

TRANSPETRO
(Gas Transportation Services Provider)

Downstream

LIQUIGÁS
(LPG Distributon)

GASPETRO
(Gas Distributon)

Deverticalized Competitive Structure

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Upstream

Midstream

Downstream

PETROBRAS

Onshore gas fields:
Juruá (AM)
Azulão (AM)
Riacho da Forquilha (RN)
Buracica (BA)
Miranga (BA)

Offshore gas fields:
Ceará Mar (CE)
Merluza (SP)
Rio Grande do Norte Mar (RN)
Sergipe Mar (SE)
Enchova (RJ)
Pampo (RJ)
Pargo (RJ)

FOR SALE

PETROBRAS
LNG Terminals

FOR SALE

TBG

FOR SALE

TSB

FOR SALE

TAG

NTN

SOLD

NTS

TRANSPETRO

GASPETRO

SOLD

LIQUIGÁS

FOR SALE

Gas Market Overview: Demand Drivers

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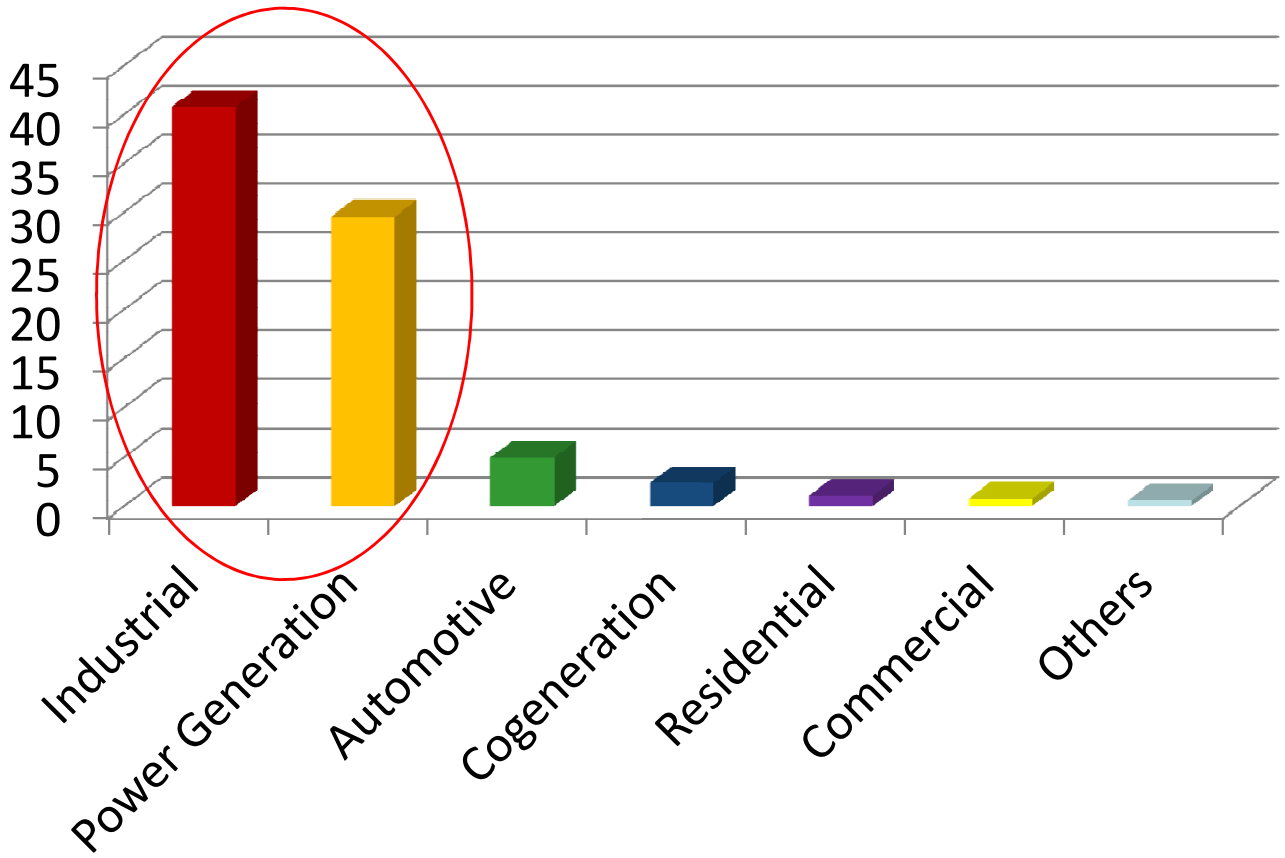
Natural Gas Demand in June/2017: 78 MM m^3/day



Source: MME Natural Gas Industry Monthly Report (June 2017)

Gas Market Overview: Brazil x Americas

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Natural gas: Consumption in billion cubic metres*

Billion cubic metres	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	**2016**
US	614.4	654.2	659.1	648.7	682.1	693.1	723.2	740.6	753.0	773.2	**778.6**
Canada	96.9	96.2	96.1	94.9	95.0	100.9	100.2	103.9	104.2	102.5	**99.9**
Mexico	66.6	63.4	66.3	72.2	72.5	76.6	79.9	83.3	86.8	87.1	**89.5**
Total North America	778.0	813.8	821.5	815.9	849.6	870.6	903.3	927.8	944.1	962.8	**968.0**
Argentina	41.8	43.9	44.4	42.1	43.3	45.1	46.7	46.7	47.2	48.2	**49.6**
Brazil	20.6	21.2	24.9	20.1	26.8	26.7	31.7	37.3	39.5	41.7	**36.6**
Chile	7.2	4.3	2.4	2.4	4.9	5.0	4.6	4.6	3.8	4.1	**4.5**
Colombia	7.0	7.4	7.6	8.7	9.1	8.8	9.8	10.0	10.9	10.7	**10.6**
Ecuador	0.4	0.5	0.4	0.5	0.5	0.4	0.6	0.6	0.7	0.6	**0.6**
Peru	1.8	2.7	3.4	3.5	4.9	5.5	6.2	6.0	6.8	7.2	**7.9**
Trinidad & Tobago	21.2	21.9	21.3	22.2	23.2	23.3	22.2	22.4	22.0	21.5	**19.1**
Venezuela	31.5	36.2	34.3	32.3	32.2	29.7	31.4	30.5	30.7	34.5	**35.6**
Other S. & Cent. America	4.0	4.5	4.8	5.0	5.3	5.9	6.5	7.0	7.3	7.3	**7.4**
Total S. & Cent. America	135.5	142.6	143.4	136.7	150.2	150.5	159.6	165.2	168.9	175.8	**171.9**

Source: BP Statistic Review of the World Energy 2017

Gas Market Overview: Demand Projection until 2050

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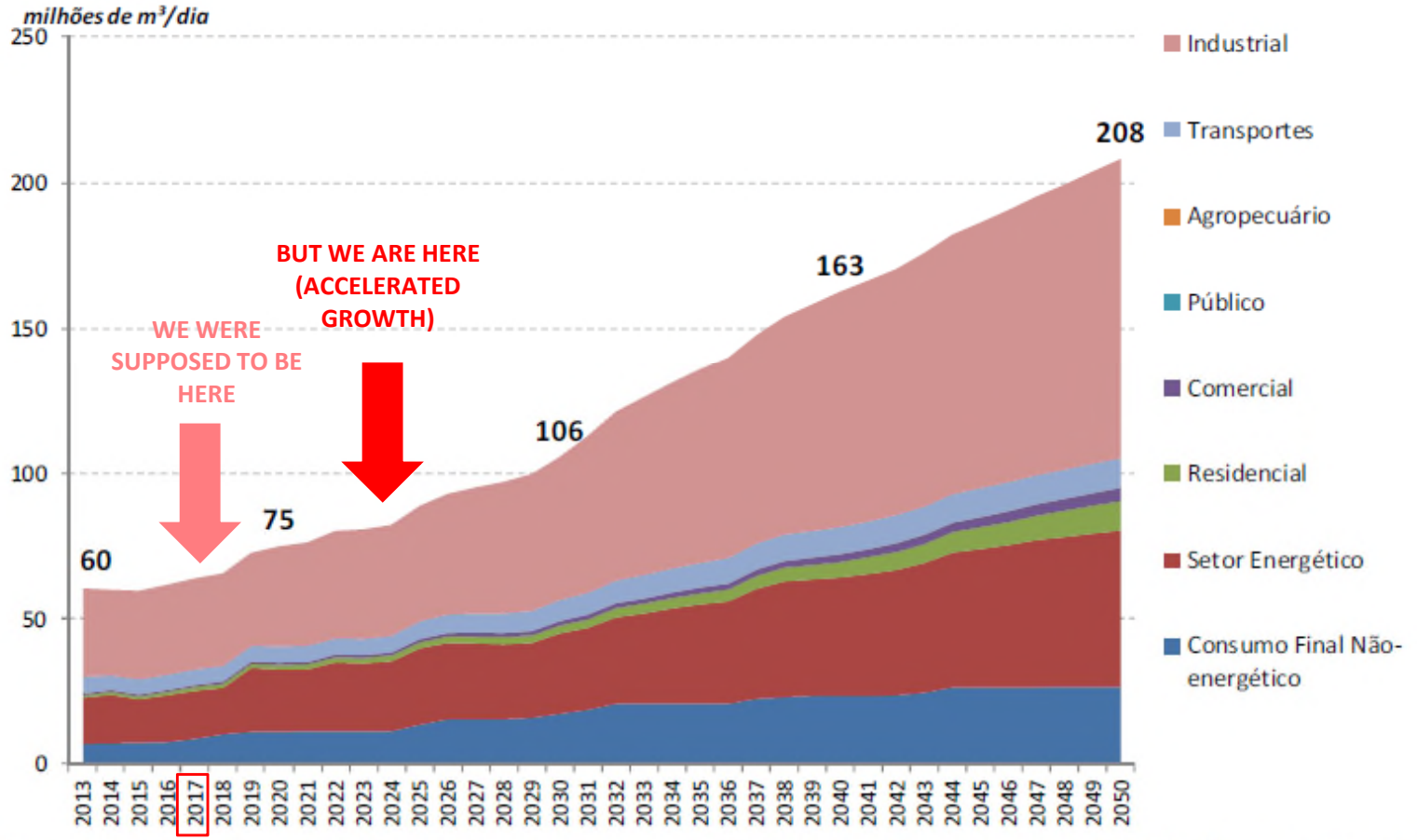

Figura 131- Projeção do consumo final de gás natural (milhões de m3/dia)

Source: EPE – Energy Demand 2050 (January 2016)

Gas Market Overview: Production x Importation

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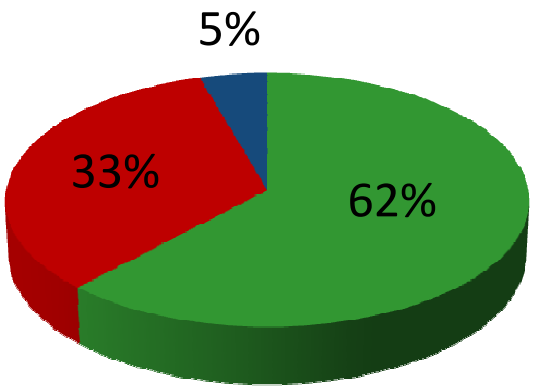

- National Production — **Petrobras expects to increase gas production with pre-salt exploration**
- Bolivia Importation — **Importation of 30 MM m^3/day by Petrobras will reduce after 2021**
- GNL Importation
  - **Nigeria**
  - **Trinidad and Tobago**
  - **Angola**

Gas Market Overview: Storage and Regasification

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NO STORAGE FACILITIES AND 3 FRSU TERMINALS

Pecém Terminal: 7 MM m³/day

TRB Terminal: 14 MM m³/day

Guanabara Bay Terminal: 20 MM m³/day

Source: FGV/CERI

Gas Market Overview: Transportation

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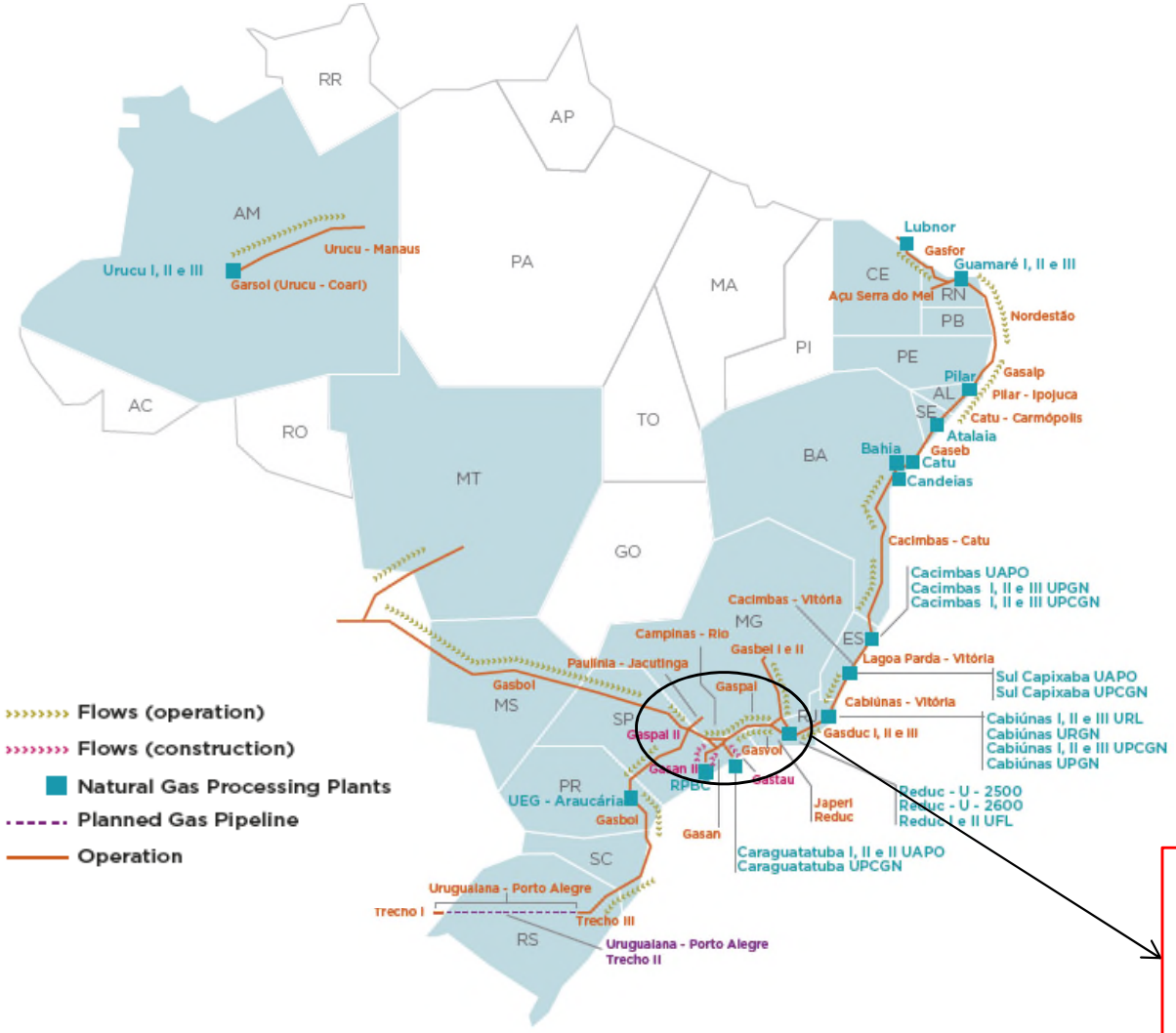
Limited Transportation Network: ~9,400 km



- ✓ **Petrobras controls and operates more than 7,000 km**
- ✓ **Recently sold 2,050km to Brookfield**
- ✓ **Northeast pipelines also to be sold by Petrobras**
- ✓ **Effective transportation unbundling => Pursuant to Gas Law, transporters may not operate in other gas activities, except for storage and operation of LNG terminals**

Petrobras sold a 90% stake of NTS to Brookfield for US$ 5.19 bi in 2016

Gas Market Overview: Distribution

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Concentrated Distribution Network: ~27,324 km

- Concentration in the States of São Paulo and Rio de Janeiro
- **22** of 26 gas distribution concessionaires are under control of the States
  - **19** concessionaires have Gaspetro (Petrobras + Mitsui) as shareholder
  - **9** concessionaires to be privatized (expected to 3Q 2018): Bahiagás (BA), BR (ES), Copergás (PE), MSGas (MS), PBGás (PB), Potigás (RN), SCGás (SC), Sergás (SE) and Sulgás (RS)
- **Gas to Grow** to address some bottlenecks:
  - **Free Market/Free Customers/Commercial By-Pass =>** Uneven State Laws - minimum consumption requirements vary from 10,000 to 1,000,000 m³/day
  - **By-Pass Fee:**
    - No full commercial and physical by-pass
    - O&M Fee x Gas Movement Fee x Gas Distribution Fee

Gas to Grow Initiative: Transition to a Competitive Market

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GAS TO GROW

MINISTÉRIO DE MINAS E ENERGIA

BRASIL GOVERNO FEDERAL

Purpose: New legal framework for the gas market in Brazil to encourage private investments.

Product: MME will submit to Congress a bill of law to amend the Gas Law by the end of 2017.

Enhanced Gas Law

Solution for Tax Issues

Gas-Power Integration

Gas to Grow Initiative: Relevant Developments

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Activity	Today	Gas to Grow
Processing, Offloading , Regasification and Liquefaction	No open access	Negotiated open access
	State tax (ICMS) inefficiencies for LNG/gas exchanges among terminal users	Symbolic exchanges and monthly accounting
Transportation	Point-to-point model	Entry-exit model
	No independent network operator	Independent network operator
	State tax (ICMS) based on point-to-point model (physical flow)	State tax (ICMS) based on entry-exit model (contractual flow)
Distribution	Uneven State laws for by-pass of consumers	Federal guidelines for development of a free market
Marketing	No organized markets	Organized markets

Power Industry Institutional Structure

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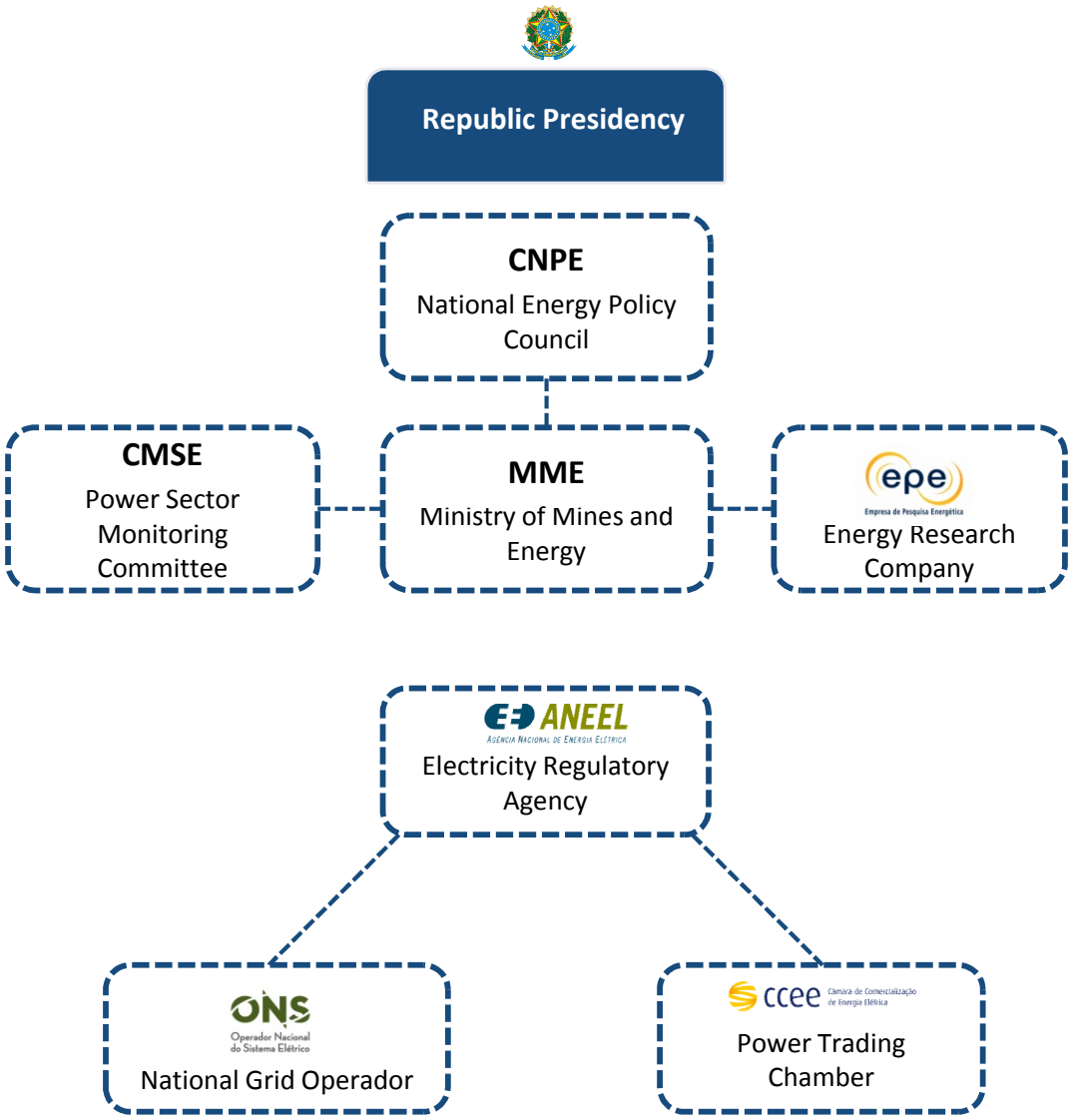
Federal

- **Policy**
- **Regulation**
- **Grid Operation & Market**



Thermo Power Regulatory Framework

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FEDERAL LEGISLATION

2000 | 2001 | 2004 | 2008 | 2014 | 2016 | 2017

PPT – Thermoelectricity Priority Program (Decree No. 3.371/2000)

Energy Crisis

BLACKOUT

New Power Industry Model Law (Federal Law No. 10,848/2004) Creation of CCEE (replaced MAE), EPE and CMSE. New attributions to CNPE.

A-3 and A-5 New Energy Public Auctions – 6 New LNG TPPs (Petrobras' Regas Capacity)

A-5 New Energy Public Auctions – 3 New LNG TPPs (New LNG Terminals)

MME PUBLIC CONSULTATION NO. 33

Gas-Power Integration

IMPROVEMENTS TO THE POWER REGULATORY FRAMEWORK

FEDERAL REGULATION

2000 | 2006 | 2009 | 2013 | 2017

MME Ordinance No. 43/2000 - Definition of TPPs under PPT

MME Ordinance No. 215/2000 - Petrobras to supply gas for 20 years for TPPs under PTT

CNPE Resolution No. 4/2006 – Priority for LNG-to-power projects

ANEEL Resolution No. 235/2006 - qualification of cogeneration TPPs (revoked ANEEL Resolution No. 21/2000)

ANEEL Resolution No. 390/2009 - construction and operation of TPPs (revoked ANEEL Resolution No. 112/1999)

ANEEL Resolution No. 583/2013 - mandatory penalty clause in the GSA of TPPs in case failure in the gas supply (revoked ANEEL Resolutions No. 190/2005 and No. 222/2006)

CNPE Resolution No. 18/2017 – ANP and ANEEL to review penalties for failure in the gas supply

Power Market Overview: Demand Projection until 2026

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Tabela 21. Sistema Interligado Nacional. Consumo de eletricidade na rede (GWh)

Ano	Residencial	Industrial	Comercial	Outros	Total
2016	131.159	163.605	87.645	74.158	456.567
2017	134.515	165.115	89.520	76.345	465.496
2018	139.097	168.552	92.592	79.009	479.250
2019	144.088	172.359	96.102	81.938	494.488
2020	149.877	177.204	100.100	85.319	512.500
2021	156.022	185.754	104.297	88.935	535.008
2022	162.458	195.364	108.687	92.699	559.208
2023	169.189	201.198	113.329	96.680	580.396
2024	176.238	206.906	118.238	100.891	602.273
2025	183.510	212.646	123.368	105.276	624.800
2026	191.008	218.629	128.723	109.839	648.200
Variação (% ao ano)					
2016-2021	3,5	2,6	3,5	3,7	3,2
2021-2026	4,1	3,3	4,3	4,3	3,9
2016-2026	**3,8**	**2,9**	**3,9**	**4,0**	**3,6**

Source: EPE Power Demand Projection 2017-2026 (January 2017)

Power Generation Matrix

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- Natural gas thermoelectric generation is a **back-up source**, subject to **merit order dispatch**, but since 2012 TPPs have been dispatched on a continuous basis due to drier weather conditions/lower hydroelectric generation

- In 2015, **12%** of the power supply was generated by **natural gas TPPs**

POWER GENERATION MATRIX

Sources	N° Plants	KW	%
Hydro	1,267	99,394,714	61.17
Biomass	536	14,206,367	8.74
Natural Gas	**162**	**13,003,427**	**8.00**
Oil/Fossil Fuels	2,215	10,172,075	6.26
Importation	--	8,170,000	5.02
Wind	470	11,498,043	7.07
Coal	21	3,713,495	2.28
Nuclear	2	1,990,000	1.23
Solar	60	311,732	0.19

Source: ANEEL's website in October 2017

TPP Dispatch Profile

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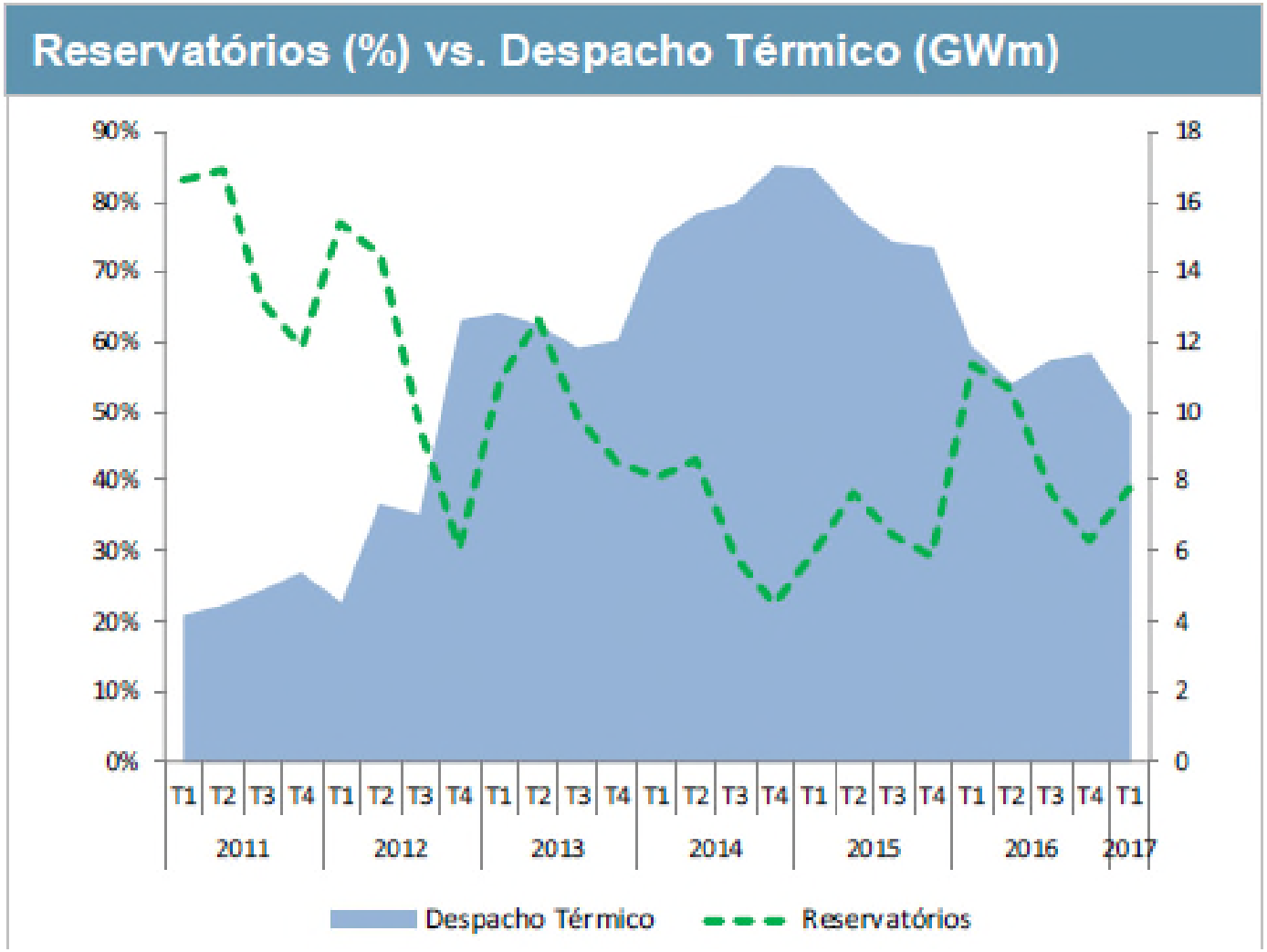

Source: AES Tietê Results 1Q 2017

Power Contracting Environments

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Free Market

Ambiente de Contratação Livre - ACL

- **Free contracting**
- **Participants:** Generators, Traders and Free/Special Customers
- **PPAs:** All terms and conditions are freely negotiated, including price

Regulated Market

Ambiente de Contratação Regulada - ACR

- **Contracting through public auctions with lowest price criteria**
- **Participants:** Generators, Distributors and Captive Customers
- **PPAs:** All terms and conditions are set forth in the auction notice

ACR Public Auctions Overview

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MAIN FEATURES:

Lowest energy price criteria.

The ACR public auctions were primarily designed to ensure:

(i) lower electricity rates to final customers; and

(ii) development of different power generation sources.

All distribution companies are required to procure 100% of their demands through public auctions.

Long-term PPAs (usually 15-25 year PPAs for TPPs).

ACR Public Auction – PPA for Gas TPPs

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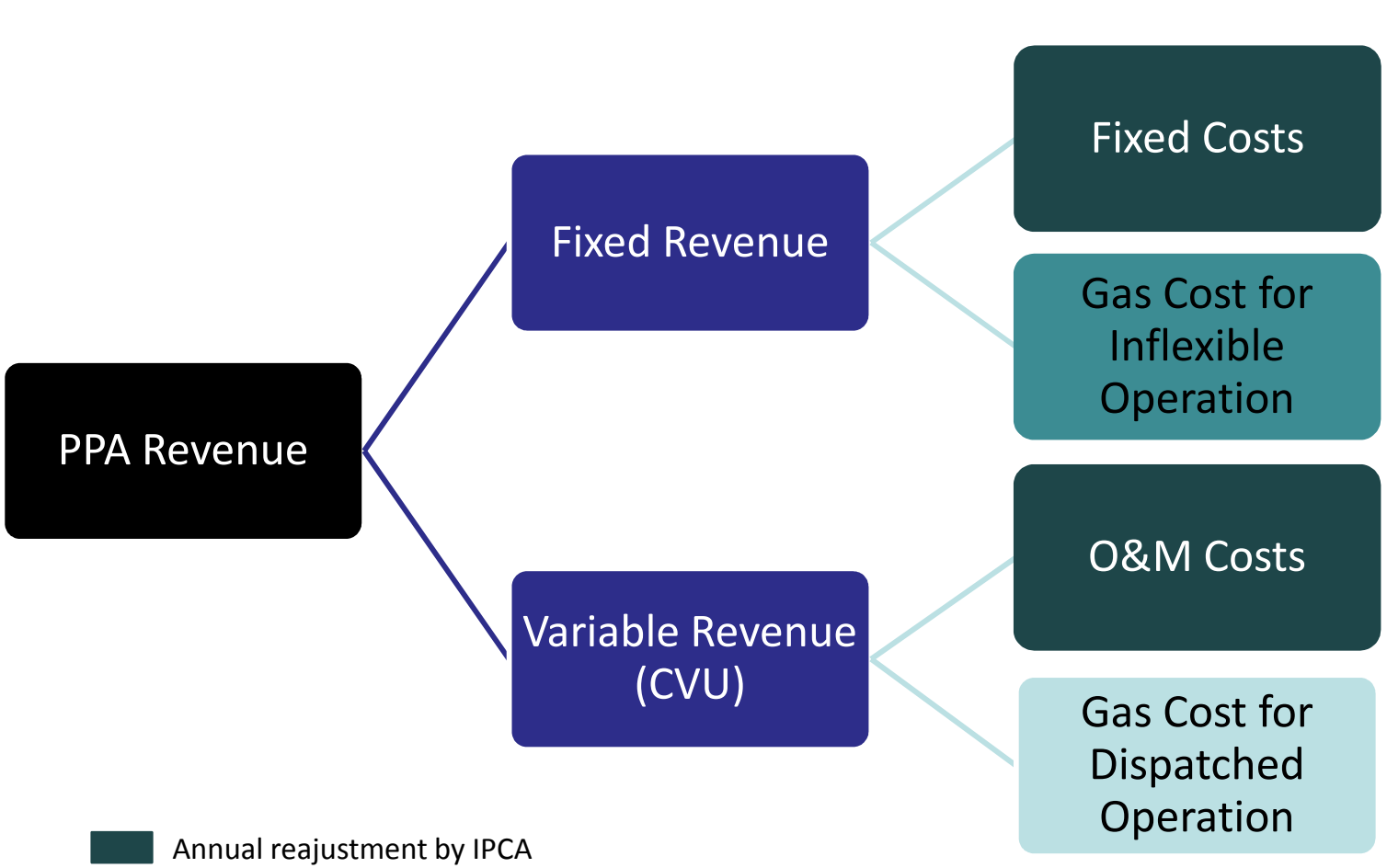

(i) ROI;
(ii) grid connection and use costs;
(iii) insurance costs;
(iv) financing costs; and
(v) taxes.

Annual reajustment by IPCA

Annual reajustment by USD exchange rate + international gas price index

Monthly reajustment by USD exchange rate + international gas price index

ACR Public Auctions

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MORE FLEXIBILITY AND PREVISIBILITY

Auction	Prior to August 2017	After August 2017*
New Energy	A-3 and A-5	A-3, A-4, A-5 and A-6
Existing Energy	A and A-1	A, A-1, A-2, A-3, A-4 and A-5
Alternative Energy	A-1 and A-5	A-1, A-2, A-3, A-4, A-5 and A-6
Reserve Energy	Unlimited	Unlimited
Adjustment	0-4 months	0-4 months
Priority Projects	A-3 and A-5	A-5, A-6 and A-7
New Energy and Transmission	N/A	A-5, A-6 and A-7

* MME TO PUBLISH AUCTIONS SCHEDULE BY MARCH 30 EVERY YEAR.

* MINIMUM OF 2 NEW ENERGY AND 1 EXISTING ENERGY AUCTIONS EVERY YEAR (IF THERE IS DEMAND).

* Pursuant to Decree No. 9,143, dated August 22, 2017.

Upcoming A-6 Auction

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RULES THAT ARE MORE ADEQUATE TO INTERNATIONAL GAS MARKET

Rule	Last Auction	Next Auction*
Evidence of a long-term GSA	15-year term + 10-year renewal contracted 5 years in advance	10-year term + 2 renewals contracted 5 years in advance
50% inflexibility limit	No annual seasonality	Annual seasonality
Gas price component readjustment periodicity	Annually	Monthly
Gas price component readjustment index	Henry Hub, Brent, NPB or JKM	Henry Hub, Brent, NPB, JKM or US inflation (CPI-U)
Gas price component in Fixed and Variable Renenues	Same price	Different prices

* 1º A-6 AUCTION - DECEMBER 2017

GSA Penalty Requirement

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ANEEL Resolution No. 583/2013 - mandatory penalty clause in the GSA in case failure in the gas supply as requirement for approval by ANEEL for the commencement of commercial operation of TPPs.

$$VSm = \left[PMEDm + j \times \left(\frac{PLD\max - PMEDm}{4} \right) \right] \times ENPm$$

POWER SPOT PRICE

UNGENERATED POWER AMOUNT

IMPROPER RISK ALLOCATION TO GAS SUPPLIER

CNPE Resolution No. 18/2017 – ANP and ANEEL to review penalties for failure in the gas supply.

Regulatory Permits – Gas, Power & Environment

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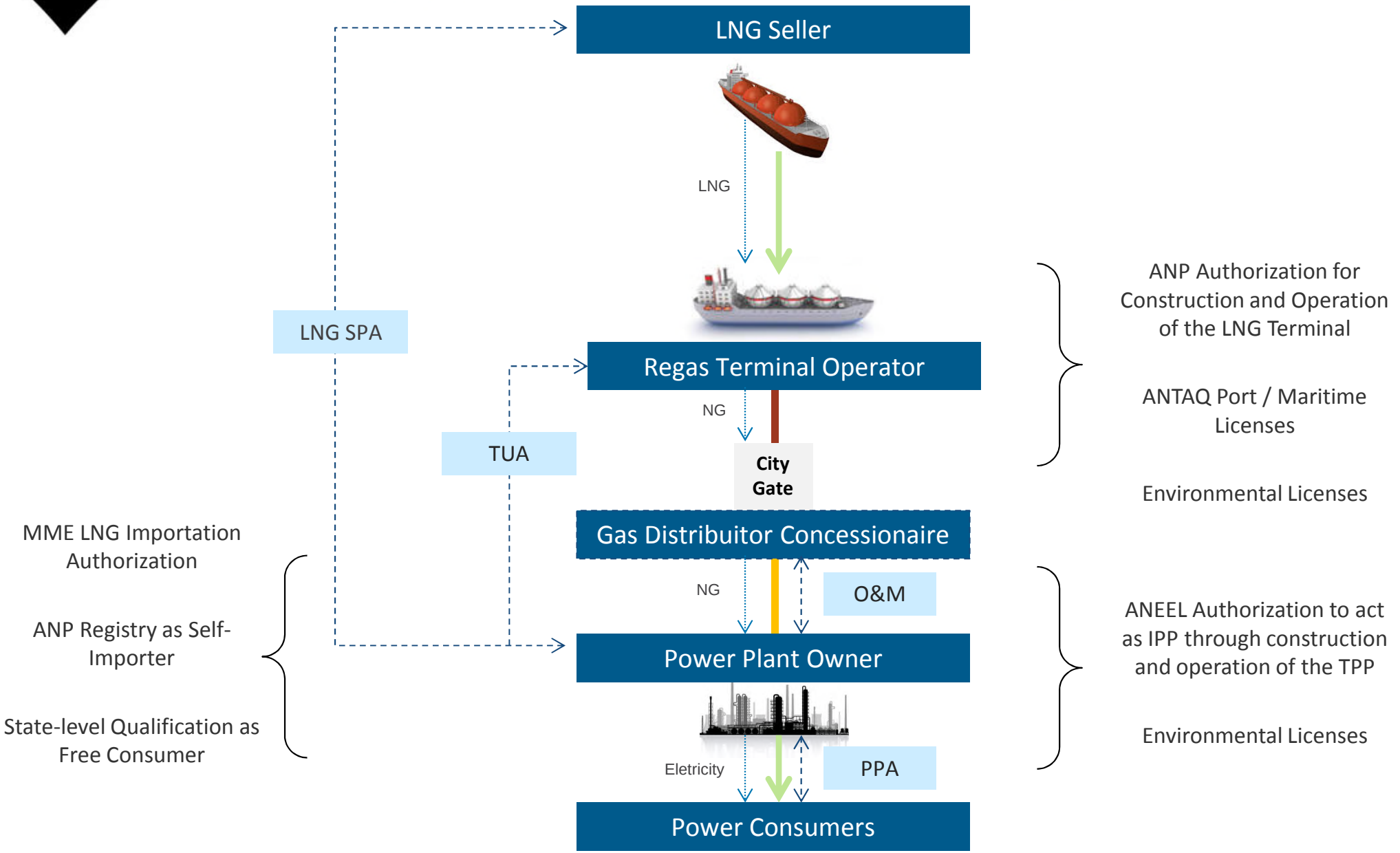

Final Considerations

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- Petrobras' gas assets divestiture will mitigate its monopoly over the Brazilian gas industry and allow the entrance of new players
- Gas to Grow initiative will solve tax and regulatory bottlenecks
- Growing renewable intermittency + high dependence on hydro power = **power system needs reliability**
- Among other power sources, gas is the best alternative to provide such reliability -> lower CO^2 emission, lower gas prices, high operational flexibility and closer to power demand centers
- Uncertainties in relation to Bolivia and pre-salt gas ->

New LNG terminals

Contents

- Structuring LNG-to-power projects
- Mitigating project-on-project risks
- Contracting for the procurement of LNG, LNG storage and regasification services, and access to transportation and distribution gas pipelines

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Structuring

Key issues

- How many different players will the overall project have? How many separate agreements will be needed?

  - ✓ LNG seller
  - ✓ LNG buyer
  - ✓ Owner of the regasification terminal
  - ✓ Operator of the regasification terminal
  - ✓ Holder of regasification rights
  - ✓ Gas off-taker from the regas terminal
  - ✓ Gas pipeline transportation service provider
  - ✓ Power plant owner/Fuel gas purchaser

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Commercial Risks for Gas-fired Generators

- Note: this presentation does not address the issues of an "IPP" project, where a power plant delivers physical volumes to one buyer (typically a state-owned utility) at a defined interconnection point for the life of the PPA
- This presentation reflects the power market design in Brazil as explained in Session One
- Expected plant dispatch profile at the time of project sanction (or acquisition) may vary significantly during ownership period
- The following factors may significantly affect fuel gas requirements within a single year in Brazil
  - Availability of water for hydro plants
  - Impact of increasing generation with renewable resources
  - Competing thermal technologies

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Commercial Risks for Gas-fired Generators

- Variable dispatch results in variable needs for fuel gas
- Challenge to avoid commitments to purchase gas in excess of actual requirements. This problem is aggravated by:
  - the lack of gas storage in Brazil for excess contracted volumes
  - Illiquid domestic gas market to sell excess contracted volumes
  - Expectations of LNG sellers
  - Unique issues under LNG regasification agreements
- Challenge to price in PPAs the costs related to fuel gas procurement when gas is otherwise not obtained (e. g., LNG take or pay, cargo cancellation fees, fixed regasification fees, etc.)

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Commercial Risks for Gas-fired Generators

- Every LNG-to-Power project has four discrete components in the value chain
  - LNG supply and shipping
  - LNG storage and regasification
  - Pipeline transport
  - Power generation

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Commercial Risks for Gas-fired Generators

- Each component
  - presents specific risks relating to its development and operation
  - requires significant capital expenditure and a long development time
  - depends on the other components in the chain
- Unless the project is completely integrated (single sponsor group executing all components), gas-fueled power project must be structured to allocate risks in a way which leaves it financeable and commercially viable – and this can present difficult practical issues

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LNG supply

- FOB vs DES purchases
- Not all the LNG sellers are the same. There are significant differences in their own requirements and risk drivers
- These differences result in varying degrees of flexibility and options that may be offered to a buyer
- A power generator in Brazil sourcing its fuel gas from LNG needs the type of LNG seller that can offer maximum flexibility and options
- LNG Sellers are showing flexibility when they understand the business of their customer, the intended use of the LNG, the competitive pressures of the customer, and the regulatory environment in which the customer operates

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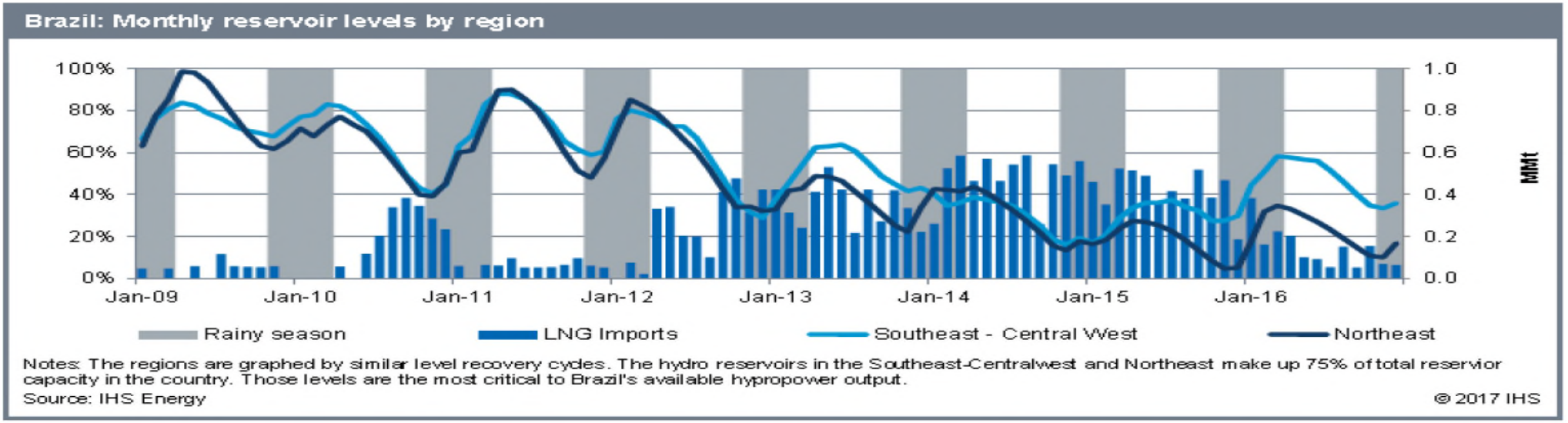
LNG supply

Brazilian Electric Sector:
The 2013 – 2015 period

- And the LNG was the responsible for "fill the gap"



- An LNG supply agreement that commits the buyer to purchase the same fixed quantity of LNG every year for a 10-15 year contract does not work in this context

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LNG supply

- A power generator in Brazil sourcing its fuel gas from LNG needs:
  - Security of supply
  - Flexibility on annual contracted volumes
  - Flexibility on delivery times
  - Competitive pricing
- (LNG storage and regasification considerations will be covered later)
- DES purchases give more room to LNG sellers to manage this flexibility given to buyers

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LNG supply

Solutions:

- The right of buyer to nominate in any given year anywhere between 50% and 100% of the ACQ
- The right of buyer to cancel scheduled cargos with 90-day advance notice relative to the first day of the scheduled delivery window. This usually comes with a cancellation fee
- Seller to undertake reasonable commercial efforts to reschedule a cargo at the request of buyer
- Seller to undertake reasonable commercial efforts to supply unscheduled cargo that the buyer may want to buy on short notice during the year

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LNG supply

Solutions (con'd):

- When at the time of contracting LNG supply the receiving terminal is not yet in operation, the right of buyer to cancel cargos that may have been scheduled for delivery prior to actual COD of the terminal. Cancelation in this case is at no cost to buyer provided that the cancellation notice is sent with certain advance notice
- Limit seller force majeure to loading terminal designated every year. At the time of designation the loading terminal must be in operation and not under force majeure. Seller has the right to designate an alternative loading terminal during the year, but at the time of such designation the loading terminal must be in operation and not under force majeure
- The same principle to apply to carrier vessels. Seller has the right to claim force majeure only in respect to a designated vessel and so long as the force majeure occurred after the designation

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LNG supply

Traditional LNG sales position:

- Normal long term LNG supply contract
  - protecting billions of dollars in the development of defined gas fields and liquefaction facilities
  - 15-25 years
  - year ahead orders with no flexibility
- This was fine for traditional destinations like Japan and Korea that could manage this profile because they had large base load demand and little alternative supply
- BUT number of purchasers has increased (because there is more LNG to be had) with more variable and/or smaller needs. With additional LNG volumes to sell, sellers need to adapt to the requirements of these new purchasers

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LNG supply

- Admittedly, short-term contracts with flexible delivery terms alter liquefaction project risk
- There is an explicit link under prevailing liquefaction project financing structures between the capital structure of an LNG project and its off-take
- A power generator in Brazil sourcing its fuel gas from LNG will probably not be a source for liquefaction project financing ("anchor" customer)
- A power generator in Brazil sourcing its fuel gas from LNG will probably be a purchaser in the secondary market

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LNG supply

What has changed?

- Movement from long-term "country-to-country" supply arrangements toward more flexible supply with portfolio players (majors and large oil and gas companies) and trading houses (Trafigura, Gunvor, Vitol and Glencore) due to increased liquefaction sources
- Portfolio players purchase LNG to subsequently distribute through their own marketing channels. With substantial balance sheets, portfolio players are in a position to provide liquidity to the market – and often commit to off-take from a project irrespective of long-term back-to-back contracts
- LNG supply now outstrips demand. Market will reach a balance:
  - 2023 (IHS Markit, Wood Mackenzie)
  - 2024 (S&P Global Platts Analytics' Bentek Energy)
  - 2025 (Bloomberg)

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LNG supply

What has changed?

- Some liquefaction projects (e.g. United States) draw feed gas from a liquid market and are no longer a marketing solution for otherwise stranded gas
- Increased use of FSRUs:
  - ✓ require lower upfront capital for regasification
  - ✓ quicker to put into operation
  - ✓ Suitable for smaller off-takers
  - ✓ 20 currently in operation and many more proposed
- The number of LNG-importing countries has more than doubled from 15 in 2005 to 39 today (IEA)

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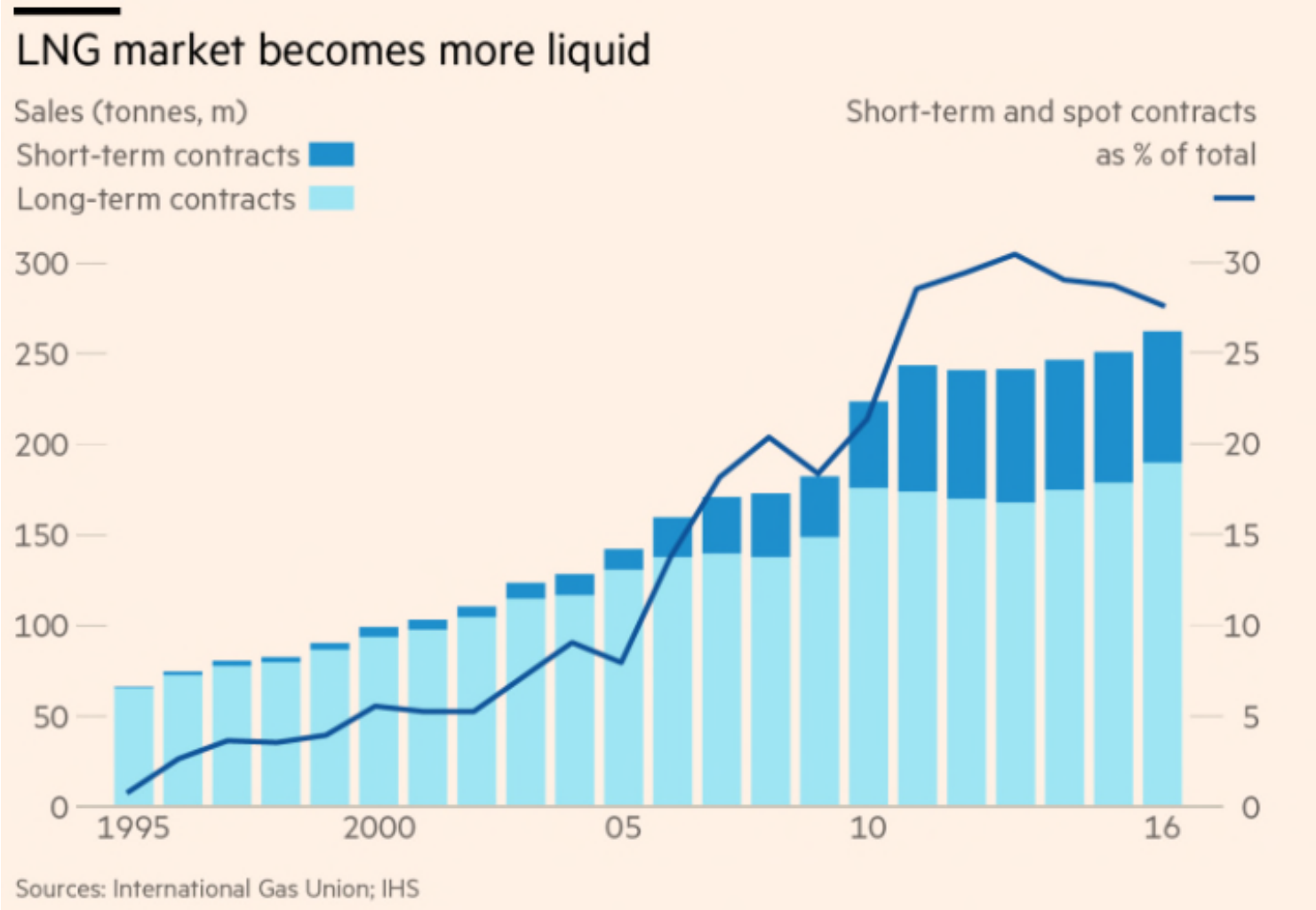
LNG supply



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Shipping

- SHIPOWNER?
- Ownership Pros:
  - ✓ Possibly less expensive
  - ✓ Retains residual value of vessel
  - ✓ Limited liability, supported by P&I insurance
  - ✓ Negotiation of building contact on standard terms less time consuming than chartering
- Ownership Cons:
  - ✓ Limited risk management
  - ✓ “Standard shipbuilding contract” places few risks on shipbuilder
  - ✓ Responsible for vessel management. Aging, repairs
  - ✓ Liability as shipowner for accidents

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Shipping

- CHARTERER?
- Charterer Pros:
  - ✓ Some risk sharing by vessel owner
  - ✓ Only obligation is to pay hire
  - ✓ Detailed charter allows for significant control
- Charterer Cons:
  - ✓ Can be more expensive than owning (bidding process may achieve most competitive price)
  - ✓ Liability for cargo may exceed shipowner's
  - ✓ Exposure in certain cases
  - ✓ Does not relieve Charterer from paying hire during sales contract force majeure
  - ✓ Subject to financing conditions of shipowner

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Shipping

Neither Owning nor Chartering

- For an LNG buyer seeking to only procure fuel gas for a power project, the risks and administrative costs of owning or chartering an LNG carrier(s) may not be justified
- This counsels for the purchase of LNG on a DES basis. LNG price is on a delivered basis and seller takes all shipping costs and risks

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Regasification

What Structure to Choose?

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Key issues

Regasification

Land or sea?

- FSRU solution.
  - ✓ Less capital than land solution/higher operating costs
  - ✓ Limited storage
  - ✓ Suitable for smaller volumes/seasonal demand
- Land solution.
  - ✓ Scalable but more expensive

How quickly is power needed?

- FSRU typically quicker to permit and build/convert than land-based terminal

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Regasification

Key issues (cont'd)

Who needs the gas? Who else will use the regas terminal?

- Only the power station?
- Other power stations / industrial users?
- Multiuser terminals present very complex commercial and operating issues

What are the local law restrictions?

- Can one person own gas/regas and power?

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Regasification

What other considerations are important?

- Tax
- Project size
- Government involvement
- Are there regulations that mandate third party access and/or require approved tariffs?

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2. Gas to Power – How to structure gas procurement?

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1. Integrated Model

2. Gas Purchase Model

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Integrated model land terminal

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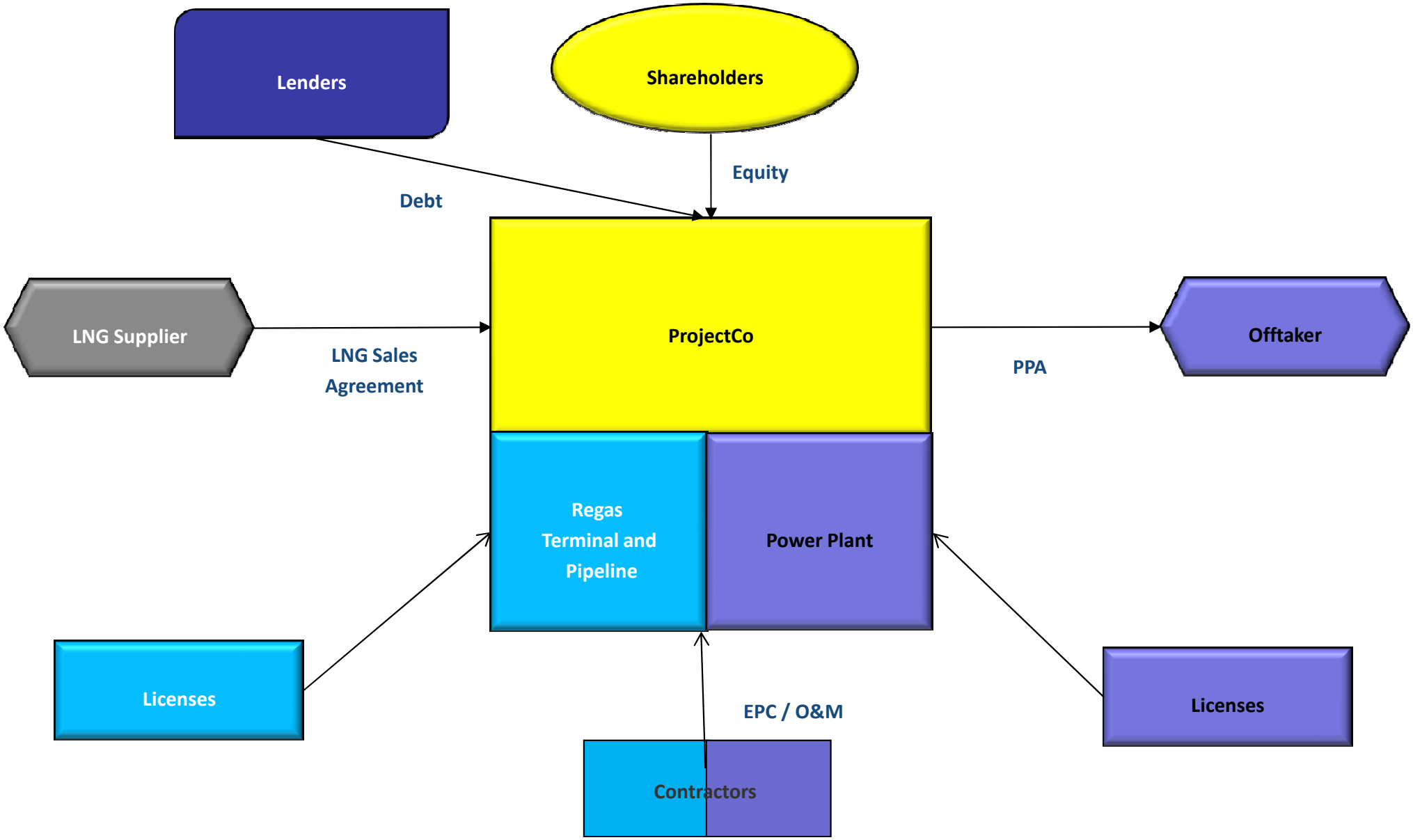

Integrated model with FSRU

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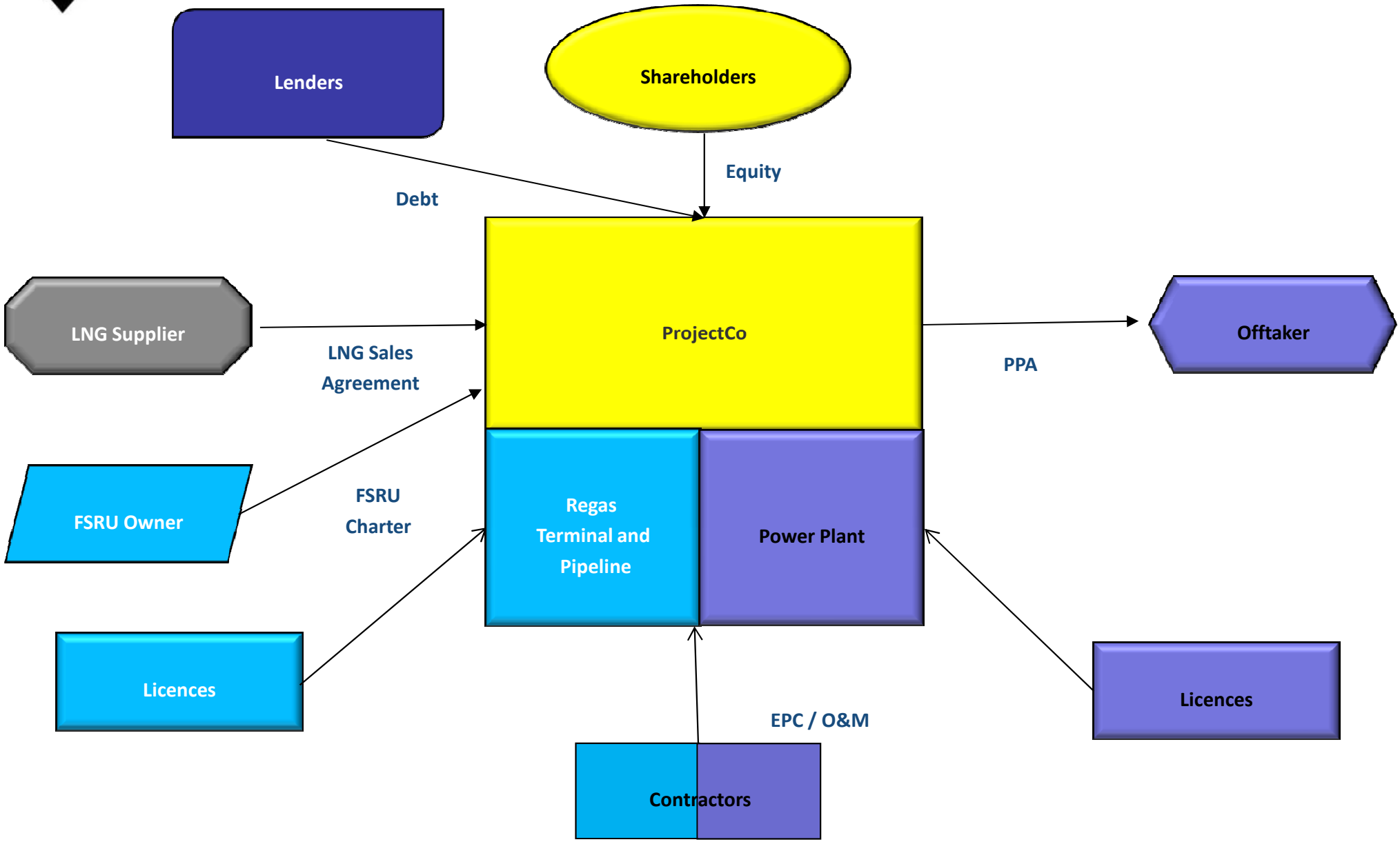

2. Gas to Power - Integrated model

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- Single financing
- Single set of sponsors
- Same person (or group of related persons):

  -Purchases the LNG DES at the terminal

  -Owns (or charters) and operates the terminal

  -Off-takes its gas and transports it to its power plant (whether in its pipeline or under a transportation services agreement with a third party)

  -LNG seller may also be part of the single set of sponsors. LNG sellers are increasingly creating their own markets

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Gas Purchase Model

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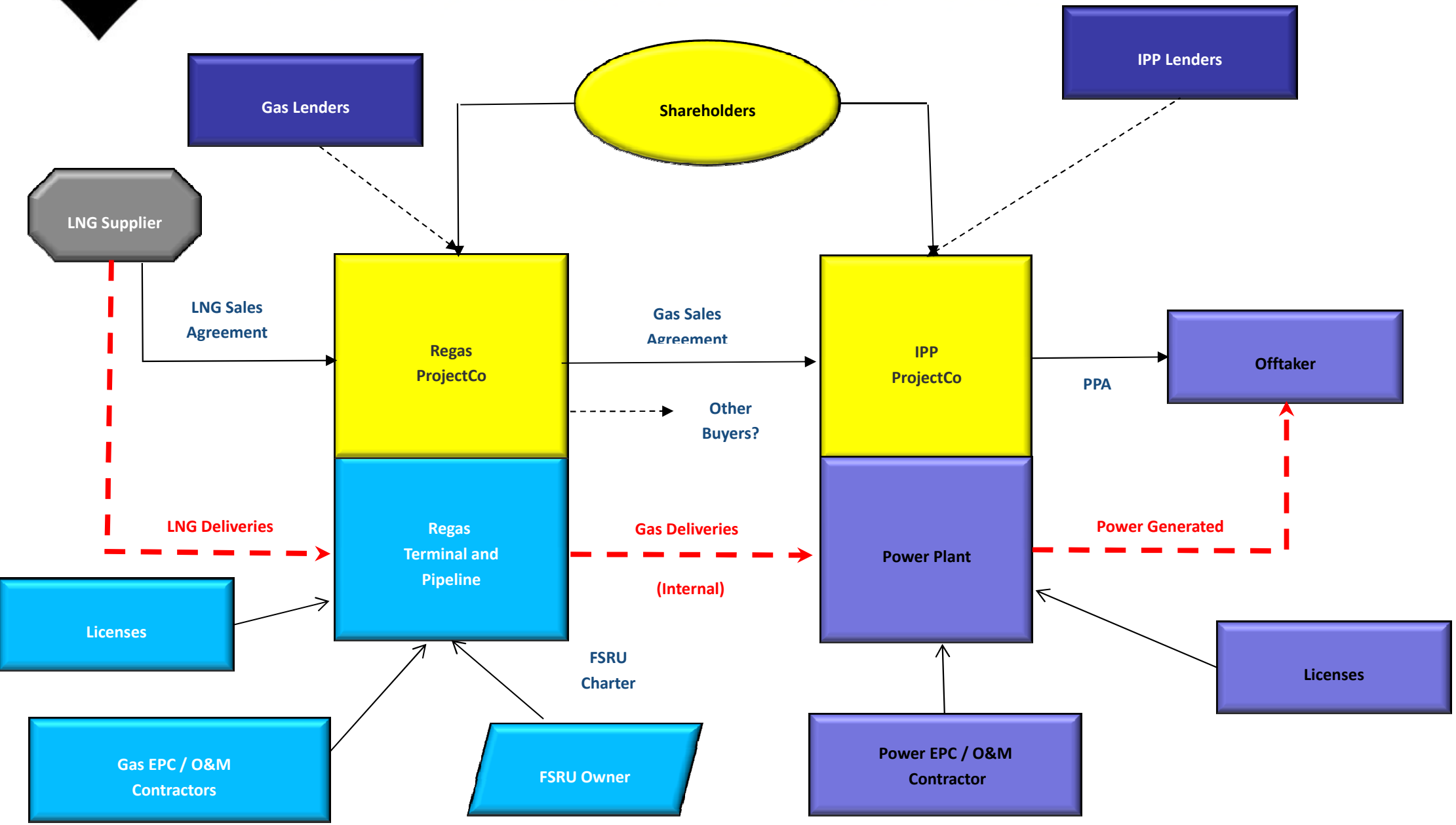

Gas Purchase model

- Differing sponsors/shareholdings on power and regas projects as two separate businesses
- Allows for separate financings
- Under this model the power project procures LNG or gas from a third party (related or not)
  - In procuring LNG the power project also needs to contract for its regasification and the delivery of the gas at a defined point
  - In procuring gas the power project is buying regasified LNG and is not responsible for the procurement and regasification of the LNG

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Gas Purchase model

- Different structures for the gas purchase model:
- Structure A.
  - Power project purchases LNG DES at the regasification terminal (Contract 1 with the LNG seller)
  - Power project contracts with the regasification terminal for the regasification of its LNG (Contract 2 with the terminal)
  - Power company receives its gas at the outlet of the regasification terminal under Contract 2 and transports the gas to the power plant (Contract 3 with pipeline company)

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Gas Purchase model

- Different structures for the gas purchase model:
- Structure B.
  - Power project purchases gas (regasified LNG) and is not responsible for the procurement and regasification of the LNG (Contract 1 with the gas seller)
  - Power company receives its gas at the outlet of the regasification terminal (or some other receipt point) and transports the gas to the power plant (Contract 2 with pipeline company)

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Regasification

Issues with Multiuser Regasification Terminals

- When the power project and the regas project are carried out by separate sponsors or by a single sponsor as two separate businesses, it is often the case that the power project (or its gas seller) is not the only customer of the regas terminal
- Unless the terminal is dedicated to the power project, if the regas terminal is a standalone and separate business the owner will seek other customers to contract the regas capacity in full. This may actually benefit a power project whose revenues are not sufficient to financially support a dedicated terminal
- But multiuser regasification terminals present very complex commercial and operational issues which require careful and early consideration for the success of both the regas project and the power project
- Among such issues are the following:

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Regasification

- Each regas customer will bring its own LNG, but a single delivery program (ADP) needs to be agreed among all the LNG suppliers, the terminal and the customers. Which delivery window is allocated to which supplier, and who has the last decision, require detailed provisions and agreements
- Each LNG regasification services agreement (TUA) gives each Regasification Customer ("**RC**") the right to withdraw gas from the Terminal up to a maximum daily quantity. Under the TUA, each **RC** also has the right to deliver LNG to the Terminal up to a maximum annual volume.
- The right to deliver LNG corresponds to the right to withdraw gas. In multiuser terminals there is typically a requirement that operationally these two numbers match in an annual balance on a MMbtu basis. This means, for example, that if a **RC** has the right to withdraw up to 10 MMBTUs of gas per day, it has the right to bring up to 3,650 MMBTUs in LNG per year. [Note: for simplicity this outline does not factor in shrinkage.]

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Regasification

- If the terminal is going to be shared, each RC cannot have its "own" capacity to unload and store its "own" cargos and request sendout gas at its own discretion. This would be equivalent to having one FSRU (or land-based storage tank) dedicated per customer and would be cost-prohibitive to smaller users
- In situations where all RCs have the same rights, it is often the case that a customer will have gas sendout rights at a time when 100% of the LNG BTUs in the terminal have been brought in (and paid for) by another customer(s). This is specially the case with FSRUs, which typically cannot hold volumes equivalent to two full cargos at the same time
- There are two principal ways to deal with this issue:
  - One customer has firm rights and the other customer(s) has interruptible rights; or
  - The terminal must operate under a mechanism of borrowing and lending of BTUs between customers

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Regasification

- Each of such two solutions requires detailed provisions and agreements:
- If a customer is going to have firm rights and another interruptible rights, it is necessary to define what a “firm right” is. For example, can the first customer store its LNG for 2 months and effectively block the other customer out? How can the second customer program the purchase of LNG or satisfy its own gas requirements downstream under such circumstances? How much value will the terminal owner get for such interruptible rights? Can the terminal be financed under such circumstances?
- Projects with “open access” after the contract with the anchor customer has been finalized present these issues
- If the solution is that all terminal customers may exercise their sendout rights against the inventory of LNG regardless of who paid for any given cargo, inevitably one customer will be short at times (it will have taken more gas BTUs than the LNG BTUs it brought in). This creates issues related to extension of credit and time or volume requirements for the short user to return BTUs

Regasification

- Additionally, gas send out rights have to be coupled with obligations: allocation of the obligation to take boil-off gas and an obligation to take gas to make space for the next scheduled cargo (even though it is not yours) are just two examples
- LNG shortfalls relative to the volumes first scheduled in the ADP need to be addressed, because to maintain their send out plans all customers are relying on the LNG contracted by each other customer to be delivered. Disruptions caused in the LNG supply due to the fault of, or FM affecting, the LNG supplier; fault of, or FM affecting, the terminal; and fault of, or FM affecting, one customer, all need to be specifically addressed

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Structure of Gas Purchase model

- Reconciling LNG quality specifications is also an issue. Often is it not sufficient that all LNG must satisfy the gas pipeline quality specification of the destination country. Some customers may have different storage time horizons than others and an LNG too close to the spec brought by one customer may create problems of aging for another customer
- The complexity of the above issues, and many others, is compounded in an open access context where terminal customers are downstream competitors and come in at different times and have to be forced to cooperate to make the operation work for all
- The terms of the open access (whether legally required or just commercially desired) imposed under anchor arrangements must be carefully thought out from the beginning to avoid leaving unintended advantages in favor of the incumbents and disadvantages against the new comers, which reduce the commercial value to the overall regas business

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