X INTERNATIONAL RENEWABLE ENERGY INVESTMENT FORUM

The Value of Storage

November 2019

IFC International Finance Corporation
WORLD BANK GROUP

Creating Markets, Creating Opportunities

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IFC in the Power Sector - Overview

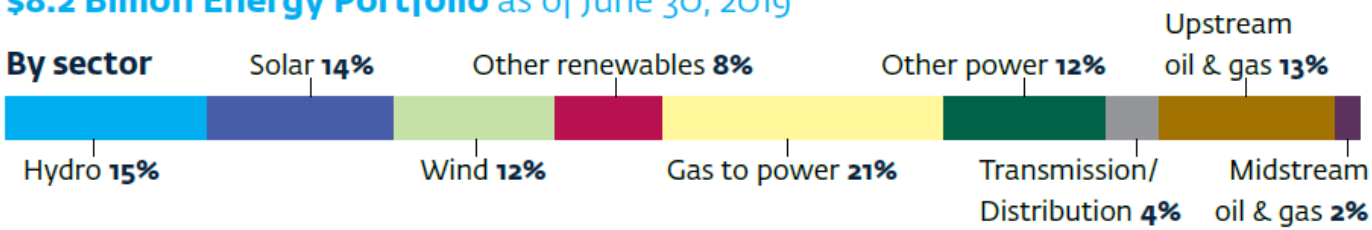
IFC: A Leading Investor in Emerging Markets Energy

More than 530 energy investments in 89 countries

About IFC

- Largest multilateral source of debt and equity financing for the private sector in emerging markets
- Provides loans, equity, quasi equity, local currency and risk management products, capital markets access, and mobilization
- Promotes social, environmental, and corporate governance standards
- AAA-rated by S&P and Moody's

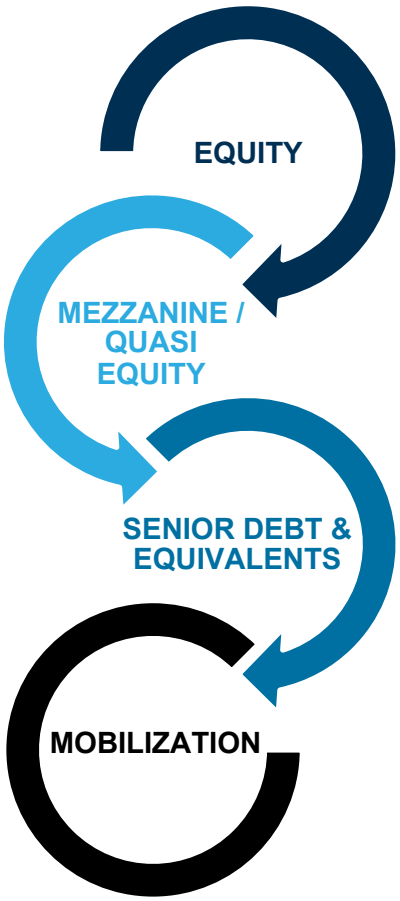
$8.2 Billion Energy Portfolio as of June 30, 2019



Approximately $4 billion in annual commitments;
66% of financing for power generation was for renewable energy.

A One-stop Financial Shop for the Private Sector in Emerging Markets

A COMPREHENSIVE RANGE OF FINANCING INSTRUMENTS

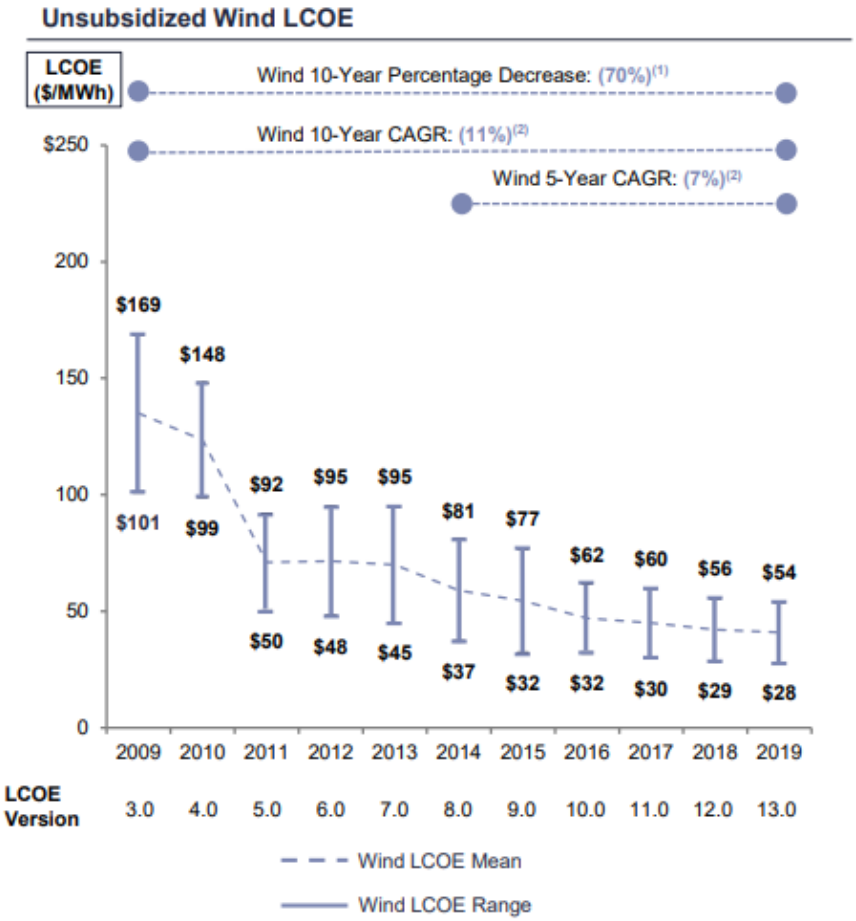


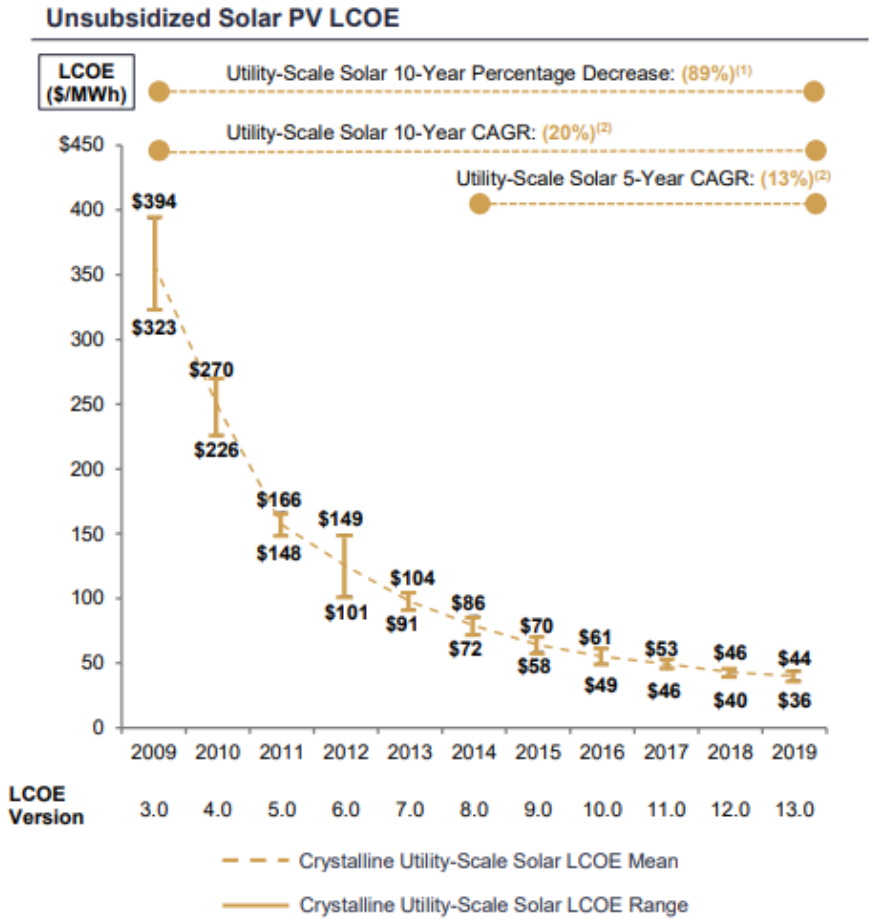
IFC Product Offering	Main Conditions
6-8 Year investment Common or preferred equity Minority shareholder Passive partner (depending on company's needs)	Up to **20%** of the capital but can also bring **self-managed funds** to reach stakes of up to **49%**
Subordinated loans Income participating loans Convertible loans	Up to **25%** of project cost in greenfield investments (IFC's own account) Up to **50%** of project cost in modernization investments (IFC's own account) Up to **100%** of debt financing (IFC's own account + **mobilization**) **Fixed** and **floating** rates **Local** & **US$/€** currencies Up to **20**-year tenors
Corporate loans: reserve based lending, straight corporate debt, partial credit guarantees for bonds Long-term project finance: greenfield, expansion	
Debt mobilization from other lenders through A/B Loan structure and parallel lenders, Equity mobilization through self-managed funds and other co-investors, Over 60-cofinanciers: commercial banks, funds, DFIs	

Hydro in a World of Cheap Renewable ?

Solar and Wind based power is getting cheaper

LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS—VERSION 13.0





While Hydro based power is getting more expensive

- **Best sites have already been developed**
- **Only marginal technology improvements in the last century**
- **Heightened Environmental and Social concerns**

So why are Hydro plants useful? Beyond the LCOE

1. Long Asset Life: >2x solar and wind

2. More reliable forecasting versus intermittent energy source like solar and wind

3. Storage

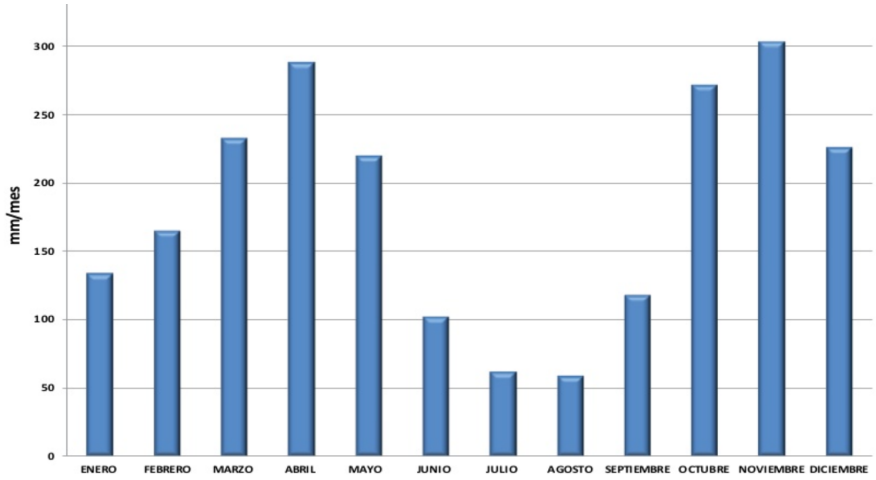
The Value of Storage

Eye-opener from 20 years ago - Reservoir El Peñol, Colombia

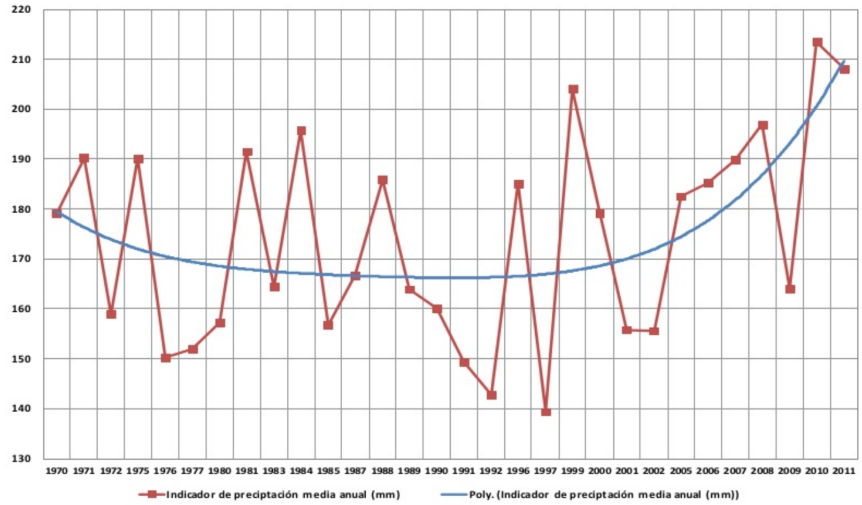
1 billion m3 / 4100 GWh => 1410 MW capacity benefiting for free

Eye opener from 20 years ago - Reservoir El Peñol, Colombia

- Seasonal regulation

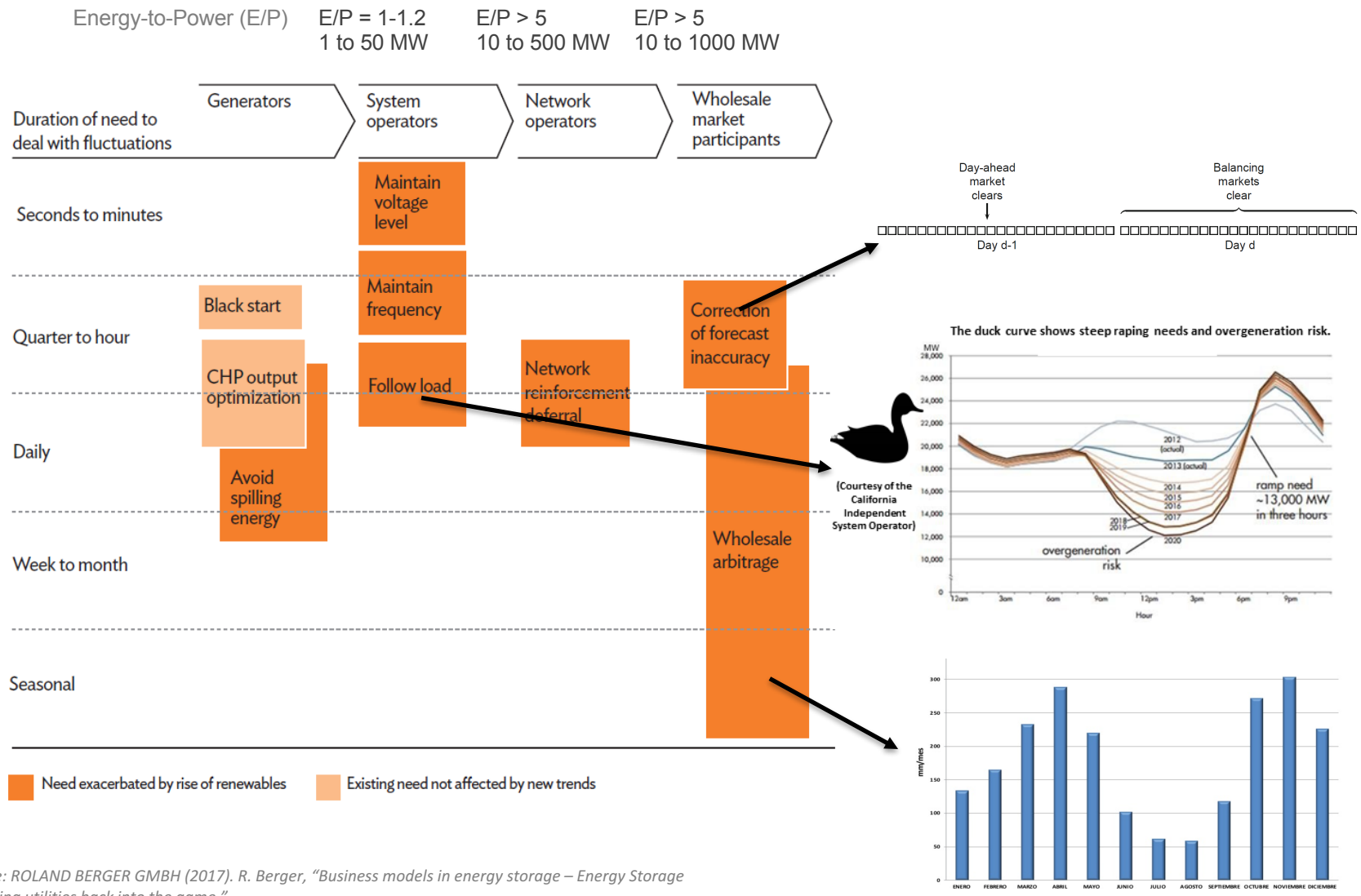


- Pluriannual regulation



➢ **1410 MW benefitting => Law suit for US$ 450m**

Applications: what are the needs?



Source: ROLAND BERGER GMBH (2017). R. Berger, "Business models in energy storage – Energy Storage can bring utilities back into the game,"

Value versus Cost

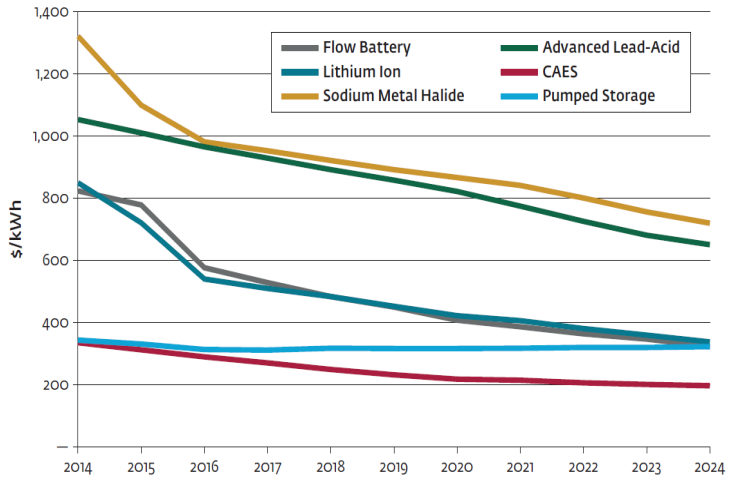
Value

- Grid reliability and quality
- Defer or avoid transmission and/or distribution upgrades
- Avoid curtailment of RE
- Balancing RE
- Avoid load shedding
- Additional hydro co-benefits including water storage for drinking and irrigation, and flood control protection.

LCOE based calculations do not accurately capture the value of storage

Cost

Utility-Scale Energy Storage System Cost Trends by Technology, Global Averages: 2014–2024



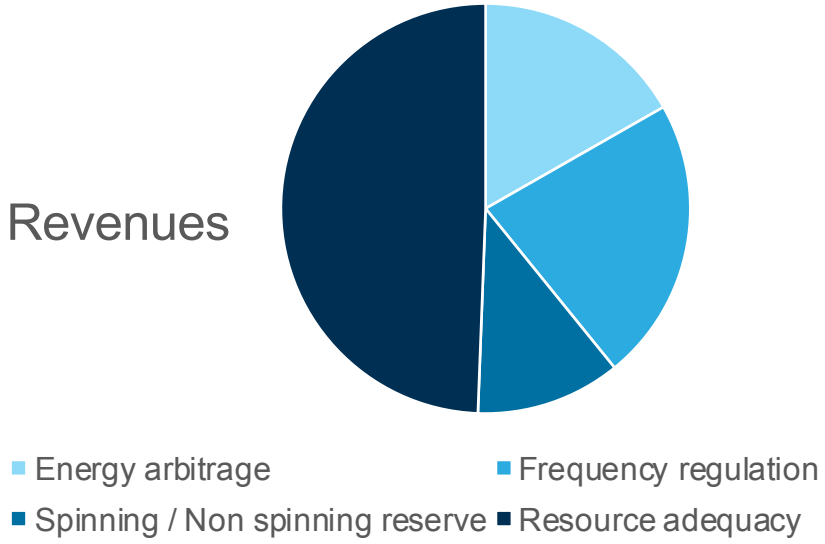
(Source: Navigant Research)

How to Pay for Storage?

Capacity contract is often required to ensure sufficient and predictable revenues

- Arbitrage (storing when price is low and dispatching when price is high) is usually not sufficient => need to be complemented by other sources such as capacity payments

LAZARD'S LEVELIZED COST OF STORAGE ANALYSIS — VERSION 5.0

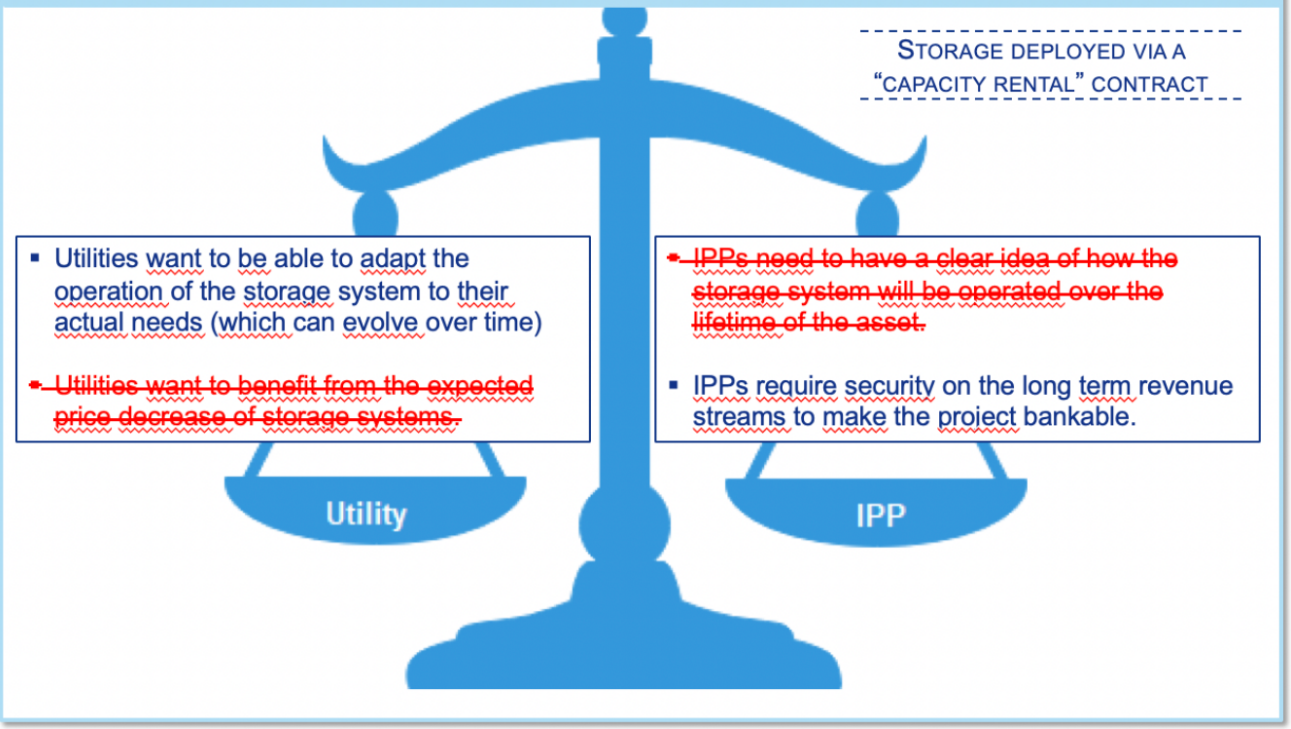


- Capacity contracts involve utilities procuring energy storage-as-a-service.

Capacity contract is often required to ensure sufficient and predictable revenues

- Capacity Contract bankability considerations:
  - Payment structure likely need to be based on a “fixed” annuity-type payment linked to actual availability of the project.
  - Lenders would also want to be satisfied with the credit quality of the offtaker.

Capacity “rental” contracts allow to conciliate some of the requirements of both the utilities and the IPPs.



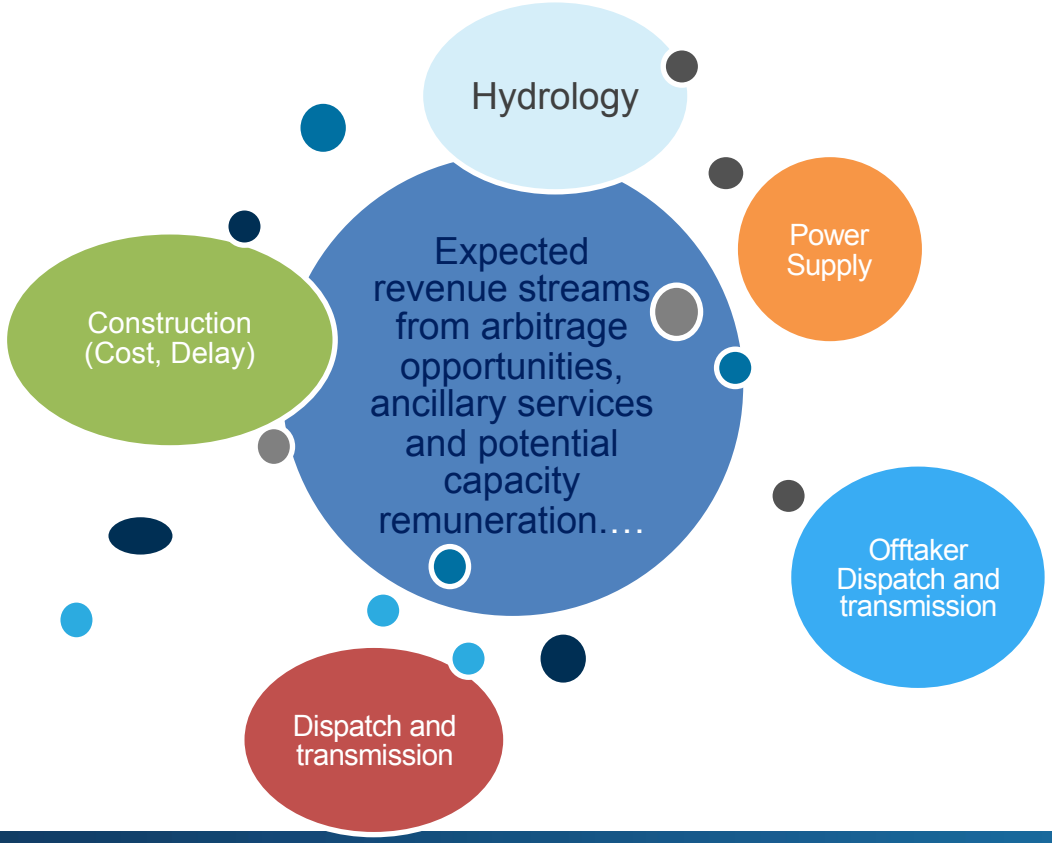
IFC is the Transaction Advisor on three energy storage projects to be developed under a PPP model

Pumped storage:
India: Upper Indravati (600MW)
Northern Macedonia: Cebren (~300MW)
Battery based:
Ukraine: Ukrenergo (TBD)

IFC is the Transaction Advisor on three energy storage projects to be developed under a PPP model

All projects:

- To be developed under a PPP model;
- Tenders expected in 2020/21;
- Feasibility assessment and commercial / legal structuring ongoing.



THANK YOU

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