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Latest Developments in PPA and Energy Hedge Agreements

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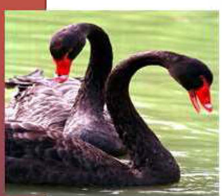
Recent System Shocks Unveil Issues in PPAs



Black Swan Events:

"Unpredictable with widespread impacts"

List of Black Swan Events

Political Action (UFLPA, Ukraine)	2022-2023
Covid-19	2019~2022
Uri	2021
Harvey	2017
Political Action (Saudis v Fracking)	2014
North Texas Freeze	2011
Ike & Financial Crisis	2008
SARS	2003
Terrorist Attacks	2001
Asian Financial Crisis	1997

3-5 Yrs

Black Swan Events, So What?

- Duration of Renewable PPAs
  - 7-20 Year Range
  - Very likely to be stressed during the term
- How are they being stressed?
  - Weather
  - Supply Chains
  - Technology Developments
  - Political Action
  - Financial vs. Physical Impacts

PPA / VPPA Terms

- Non-Energy Attributes Definition
- Delivery Point
- Supply Chain Issues
- Insurance
- Force Majeure
- Others…

PPA / VPPA Terms

- Non-Energy Attributes
  - Concepts currently undergoing dynamic changes
    - Attributes, benefits, credits, offsets, tags…
    - Compliance v. voluntary obligations
    - Ancillary services, revenue rights, performance credits, others…
  - Definitions or concepts commonly found in existing PPAs:
    - Environmental Attributes, Renewable Energy Credits, Tax Attributes, Tax Credits, Carbon Offsets, Carbon Credits, Emissions Credits, etc.

PPA / VPPA Terms

- How will an existing agreement address any of the newly created attributes?

What phone did you have and what was going on when that agreement was entered into?

- 2005: Blackberry Katrina
- 2010: iPhone 4 Macando
- 2015: iPhone 6S Ukraine Ceasefire
- 2020: iPhone 12 Covid Lockdown

Title search: Latest Developments in Energy Hedge and PPA Agreements

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