
Data Center Boom

Resolving Power Challenges in Japan

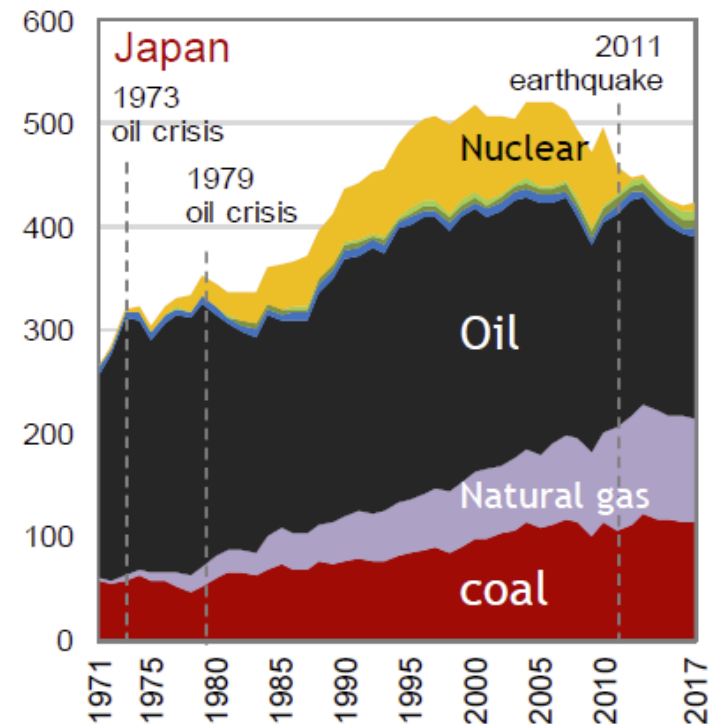


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Presented by:
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Evolution of Power in Japan

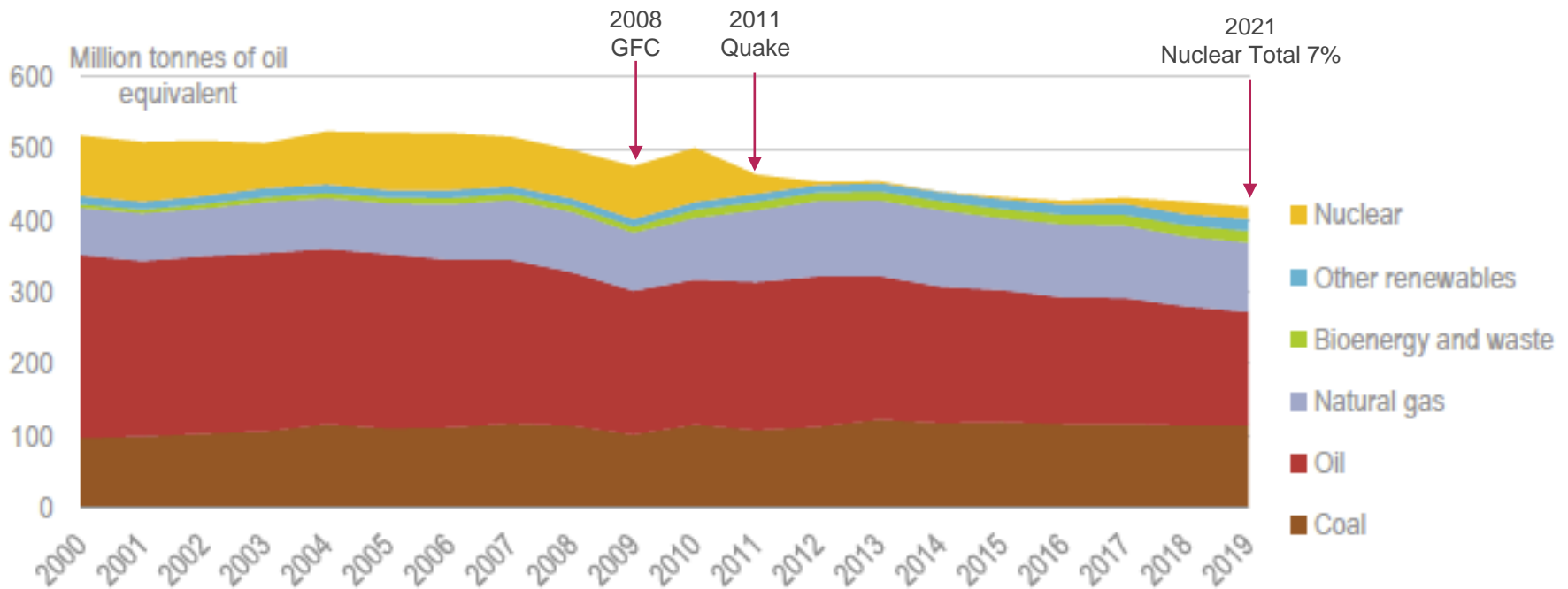
- Japan suffered oil crisis twice in the 1970's
 - First in 1973
 - Again in 1979
- Triggering Increase in Nuclear Investment
 - Power Demand Increased by 37% from 1980 – 2005
 - Nuclear Provided ~20% of Total Power Before 2011
 - Imported Fossil Fuels Provide ~70% of Power Generated (High GHG Emissions)
 - Renewables account for less than 10% of Power



Power Supply and Sustainable Power

- Impact of 2011 Quake

- Prior to 2011, 20% of Power provided from Nuclear
- From 2012 – 2018, 0% Nuclear Power
- From 2021, 7% Nuclear Power, with 10 of 33 Nuclear Plants Operating



Japan Data Center Growth

- Major Colocation and Hyperscale Facility Expansion in Japan
- Existing Providers
 - Equinix
 - @Tokyo
 - Digital Realty
 - NTT
 - KDDI/Telehouse
 - Softbank
- Recent Entrants
 - AirTrunk
 - GLP
 - GAW Capital
 - PDG
- Attempting Entry
 - NextDC
 - Yondr
 - DCI
 - StackIO
- Of the existing providers, all have facilities expansion and new build underway in Japan



Data Center Land and Power Restrictions

- Tokyo Data Center Expansion Space is Limited
 - Tokyo Bay Area has limited options for new DC Build
 - Some space available in leasable areas
 - Inzai heavily land and power limited for any new additions
 - Fuchu is rapidly filling available space, with renewed focus on the area since 2015
- Power availability is restricted, with 2 to 3-year timescales for new power implementations in most areas (Where 20MW or more is needed)



New Territories and Potential

- Urban Regions are the New Focus
- Providers, particularly new and recent entrants are looking at areas that are currently untapped
 - Saitama
 - › Advantage is large tracts of reasonably low cost, very stable land
 - › Lower impact from earthquake
 - › Still accessible to Tokyo Metro area by rail within 60 - 90 minutes
 - › Growing area of Japan outside of the major cities
 - Osaka Suburbs
 - › Nara and Kyoto areas have easy access to land with rail accessibility
 - › Some limitations with communications diversity, but that will be overcome in short order



Think Differently About Data Center Demand

- The majority of data center demand centers around “High availability”
 - Many work loads do not require uninterrupted systems
 - Crypto Mining does not require 24x 7 power and data connectivity
 - Large scale data modeling
 - › Image processing of interstellar objects
 - › Protein folding
 - › Genome Processing
 - › Engineering Simulations (particularly digital twin and CFD modeling)
- Suitable to “Tier 0” processing
 - Process when the cost is lower
 - Reduces strain on sustainability goals
 - Could be coupled closer to renewable energy, like wind and solar
 - › Process when they provide energy, not when they don’t



Smaller but Decentralized – Edge DC's Role

- Japan limitations on land and power
 - Easier to locate small land
 - › Utilize unused space that is already built like roof tops
 - › Utilize unused buildings in surrounding suburbs and shrinking cities
 - › Contiguous tracts of land are more abundant at smaller sizes
 - Easier to power
 - › Power in increments of 1MW are easier to acquire than in 40MW
 - › Decentralizing power reduces impact on data center outage
 - Network Advantages
 - › Interconnected Edge DCs can share loads, providing redundancy at the IT level, reducing cost to build while removing redundancy at the non-IT level
 - › Easier to achieve connectivity with a two or three providers
 - More sustainable
 - › Use of sustainable materials like wood to construct enclosures
 - › Non-redundant critical systems reduces power up to 50%



Sustainability's Impact on Data Center Growth

- Japan's commitment to global sustainability goals (Carbon Neutral by 2050) will result in mandatory regulation over time
- The Data Center industries interest in achieving sustainability sooner rather than later will be positive for limiting the type and depth of regulation that they will experience
- Japan's access to sustainable sources is constrained
 - Wind power is constrained by off-shore sea depths, and limited land implementation
 - Solar faces a similar issue in competition for useable land in Japan
 - Nuclear power is recovering, but is still only slated to account for 20% of power generation by 2030, and 40% by 2050



Thank you

