

Power Generation Insurance: A Masterclass on Technical Aspects, Underwriting and Claims Management

CHUBB®

Malaysian Insurance Institute
Kuala Lumpur
20th June 2023

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- Head of Power Generation and Utilities, Asia - responsible for underwriting of Operational Power Generation & Utilities, from 2017
- Chubb (ACE) Regional Risk Engineer for Asia, for eight years prior, from 2009
- 15 years in engineering, construction and commissioning of onshore power generation and downstream oil & gas / petrochemical facilities, from the early 90's
- Bach of Mech. Eng'g, Universiti Teknologi Malaysia



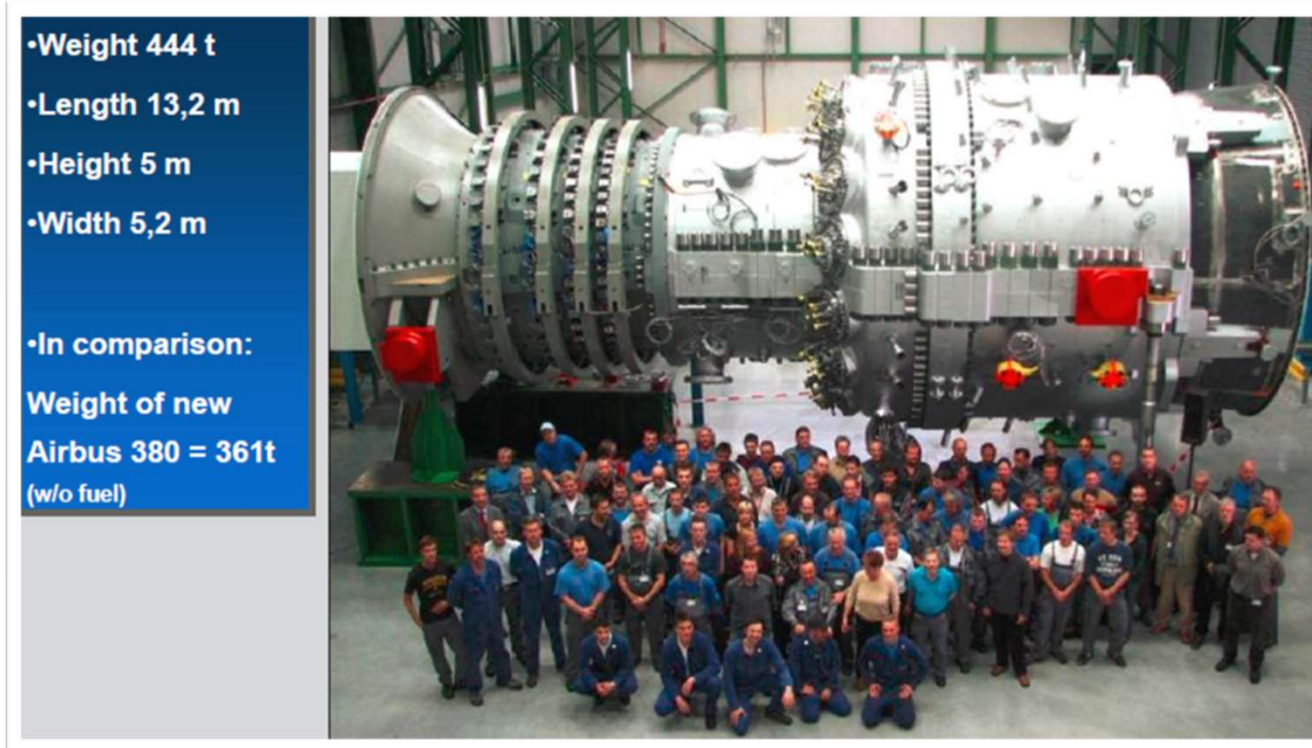
PowerGen – Volatile Class of Business



PowerGen Risks



Insuring Large PowerGen Risks



A Quick Poll...

ST-S6

How many of us here have been to a Power Plant...and know what it looks like?

- a) Yes I have been to one....just like the one in the picture below!
- b) No, I have not and no clue what it looks like?



Slide 6

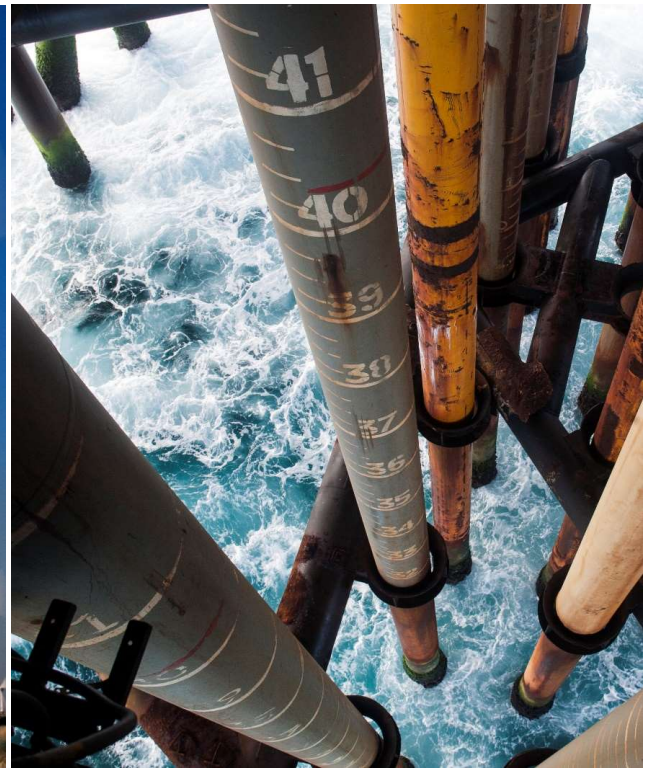
ST-S6 Question for the Audience:

How many minutes of Energy from the Sun is sufficient to fuel the annual energy consumption of Mankind? That includes all the transportation, air-conditioning, power plants, lights in here...

- a. 60 min
- b. 2 mins
- c. 10 secs
- d. I haven't the foggiest...what I do know is that we can do with a little less sun here in Singapore!

Samuel, Titus - Singapore, 6/4/2018

What are the considerations?



Engineering

ST-S2

- Type of Power Plant & Technology

- Are there specific considerations within each segment?

- Gas Turbines – S1B blade shank distress/CMSX-4 S1B failure/HPC S3-5 liberation
- Hydros – 3rd party dam monitoring, submersible (drain) pump switchgear location
- Solar – Micro-cracking, Inverter failures; Battery storage – thermal runaway;

- Are there common considerations across the different segments?

- Protection systems integrity, firewater pump performance testing, Transformer health, Hot Work Permits, gaseous suppression
- Examples...FGD Fire, Powerhouse flooding

Slide 8

ST-S2 Question for the Audience:

Who invented the lightbulb?

- A. Thomas Edison
- B. Nikola Tesla
- C. Joseph Swann
- D. I don't know

Samuel, Titus - Singapore, 26/3/2018

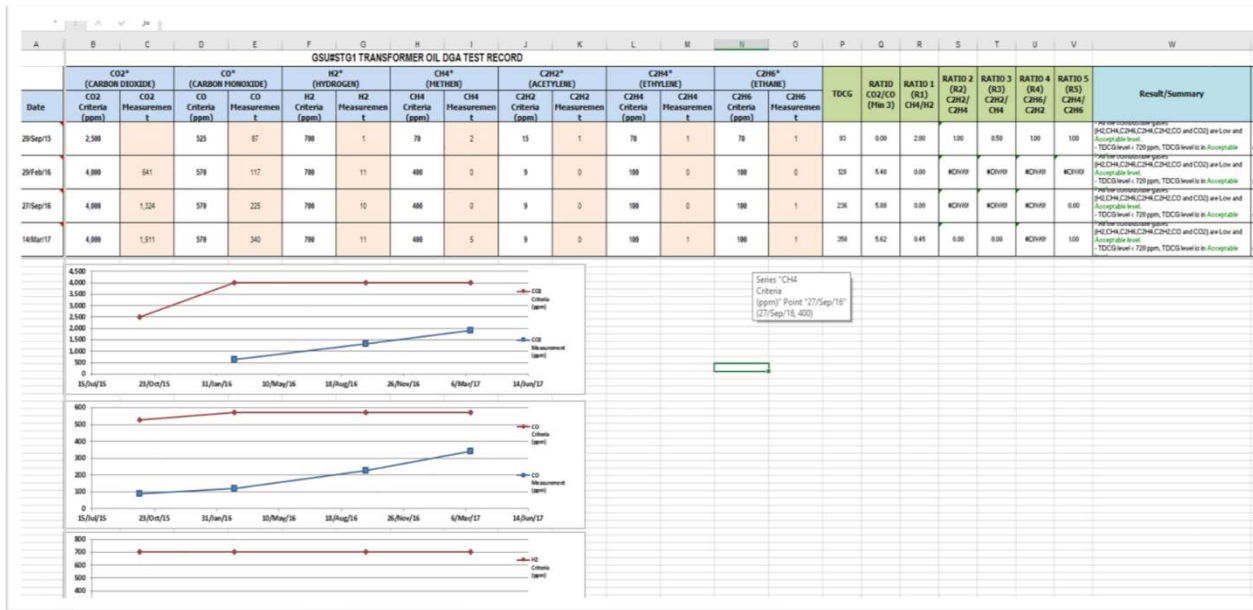
Engineering

- 3rd Party Test Info – What does the Insured do with it?

Customer Name :			
Attention For :			
Location :			
Transformer ID :			
Transformer Manufacture :			
Serial Number :			
TEST DETAILS			
LAB NUMBER	0293/T/12		
Sampling Date	6-Sep-12		
Received Date	13-Sep-12		
Report Date	19-Sep-12		
Physical Test	Unit	Method	
<i>Standard Oil Quality Analysis</i>			
Breakdown Voltage	kV	IEC 60156	-
Water Content	ppm	IEC 60814	-
Total Acid Number	mg KOH/g	IEC 60296	-
Oil Quality Index		(WP 222)	-
Interfacial Tension @25C	mN/m	ISO 6295	-
Color ASTM		ASTM D 1500	-
Appearance	Visual	Visual	-
<i>Dissolved Gas Analysis (DGA)</i>			
Hydrogen (H2)	ppm	IEC 60567	< 5
Methane (CH4)	ppm	IEC 60567	36
Ethane (C2H6)	ppm	IEC 60567	24
Ethylene (C2H4)	ppm	IEC 60567	12
Acetylene (C2H2)	ppm	IEC 60567	< 1
Carbon Monoxide (CO)	ppm	IEC 60567	334
Carbon Dioxide (CO2)	ppm	IEC 60567	2269
Oxygen	ppm	IEC 60568	6250
Nitrogen	ppm	IEC 60569	33218
% gas by volume	%	IEC 60570	4.2163
TDCG	ppm	IEE C57.104	409
CO2 / CO		IEE C57.104	6.85
Equipment Condition		IEE C57.104	1

Engineering

- Market Survey Reports - Quality of Reports are important



Coverage/Clauses/Issues

- Deductibles

- PDBI US\$250k/30 days and MBBi US\$500k/45days
- Is this adequate for a power risk with 50MW Gas Turbine in a combined cycle plant?
- How do we set a deductible in the first place?

- Supply Chain Issues

- Shipping a turbine rotor back to workshop takes 8 weeks (one-way)
- Airfreighting costs a bomb....now that the AN-225 was destroyed in the Ukraine war

A Quick Poll...on Valuations

- If we do not have a recent Valuation report (within the last 3 years), what should we do?
 - a) Impose an Average Clause
 - b) Insist on obtaining a Valuation Report within Policy Year and charging an AP
 - c) Apply the Consumer Price Index (CPI) Inflation Rate in the meantime
 - d) All of the Above
 - e) A & B

Consumer Price Index

- **Definition:** Inflation measured by consumer price index (CPI) is defined as the change in the prices of a basket of goods and services that are typically purchased by specific groups of **Households**. Inflation is measured in terms of the annual growth rate



Coverage/Clauses/Issues

- Valuation/Inflation

- When was the last time a valuation was carried out?
- We are in Asia...no inflation here! That's only in Europe/US – Really?
- Oh don't worry....we have an Average Clause!!

- Expertise Crunch

- The major manufacturers only maintain mid-level workshops in Asia
- Even in Europe/Japan – there's backlogs due to shortage in skilled technicians

Are these applicable to Renewables?

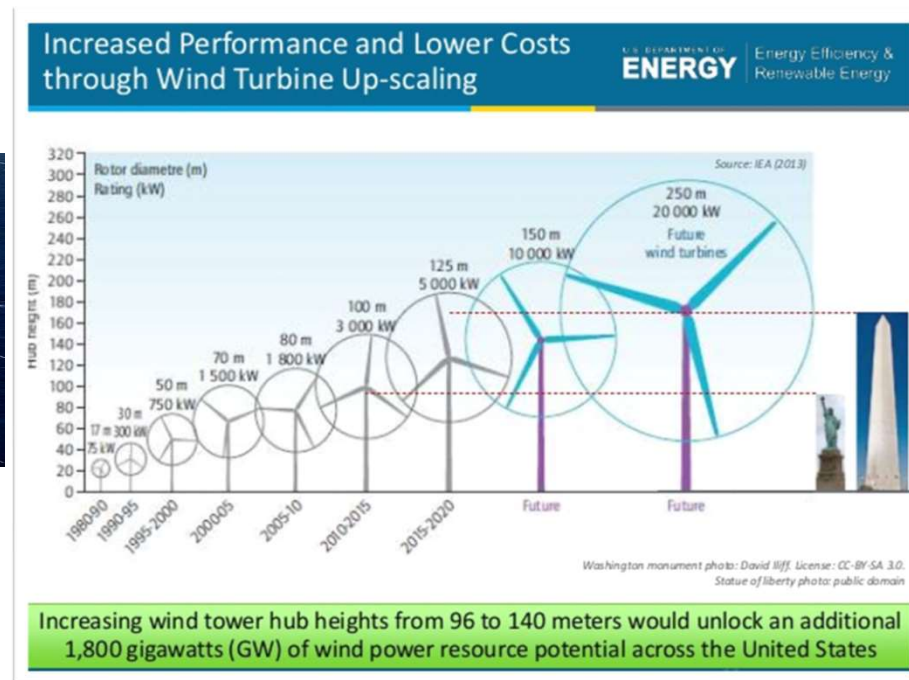
Wind Turbines – Not Getting Any Smaller



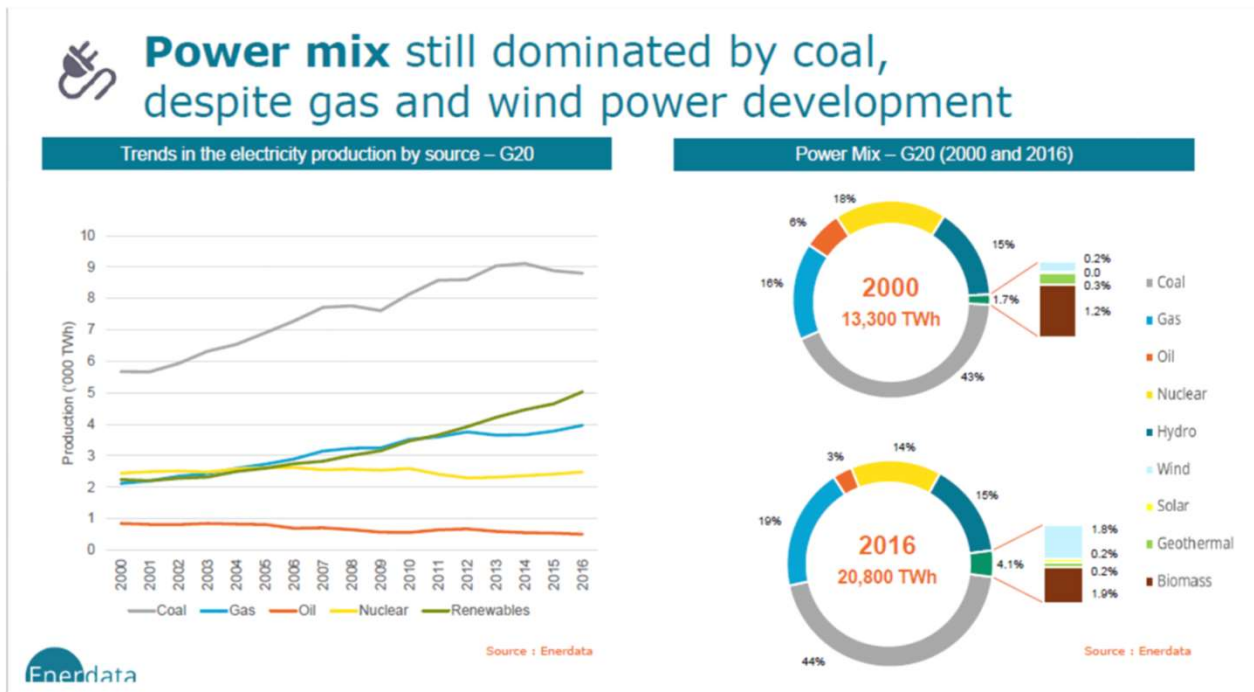
Wind Turbine - Upscaling



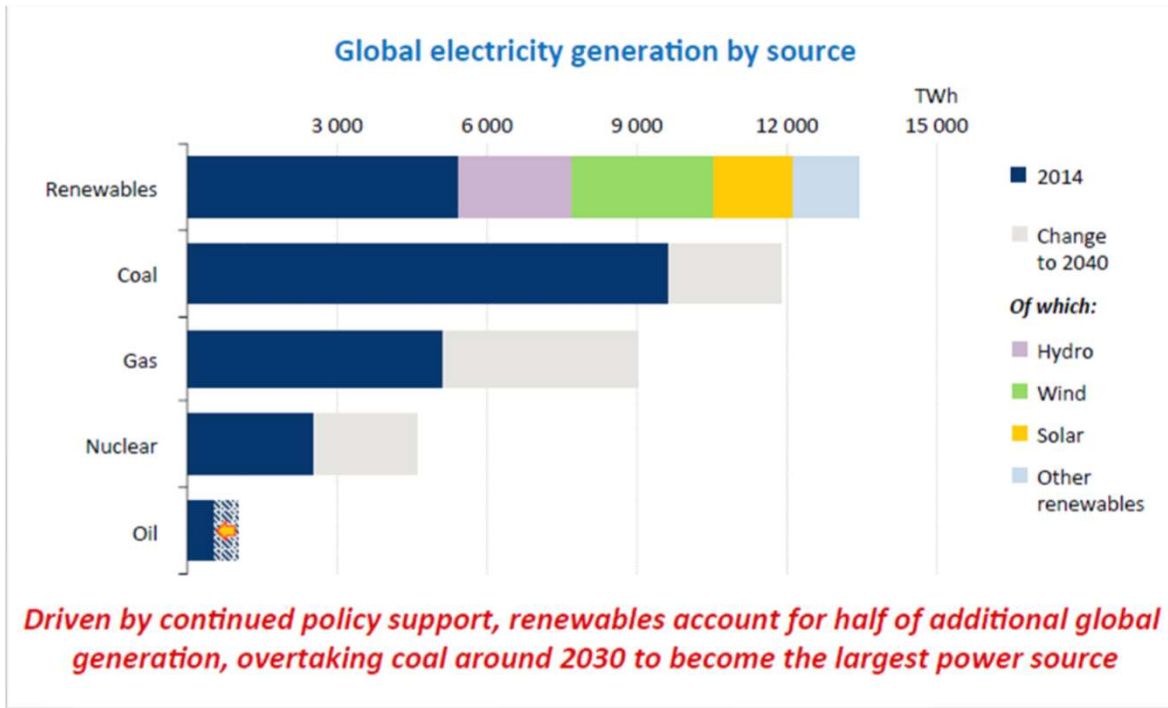
Largest offshore wind turbine – 18MW



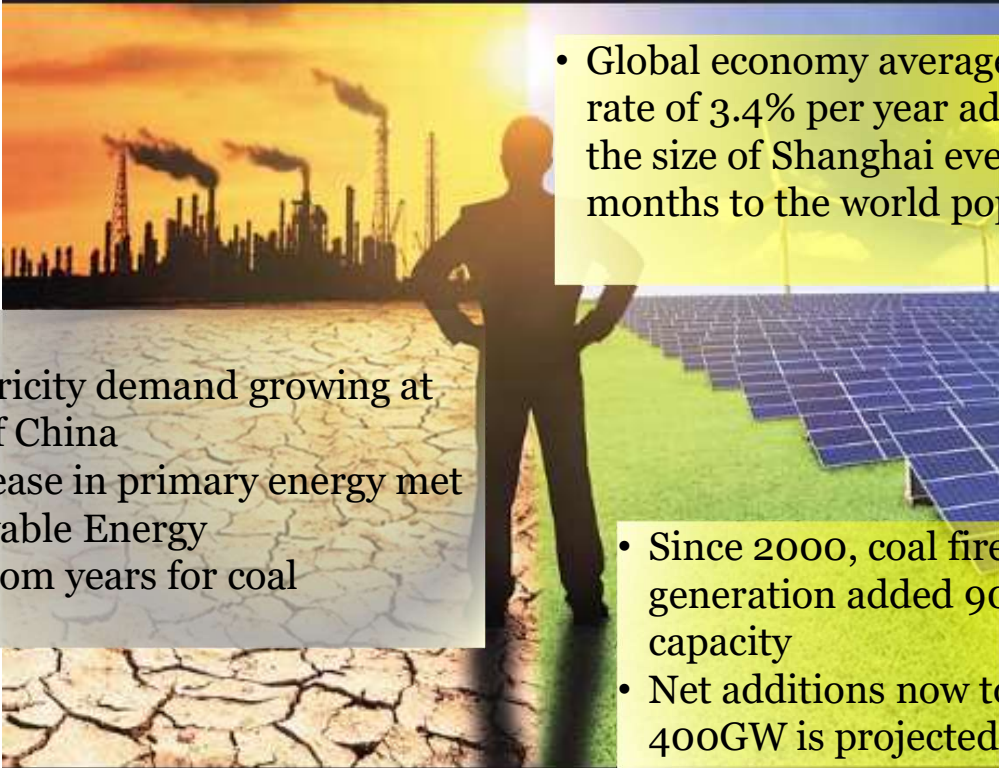
World Electricity Power Mix



Renewables Will Lead the Way...



And..Renewables Are Here to Stay



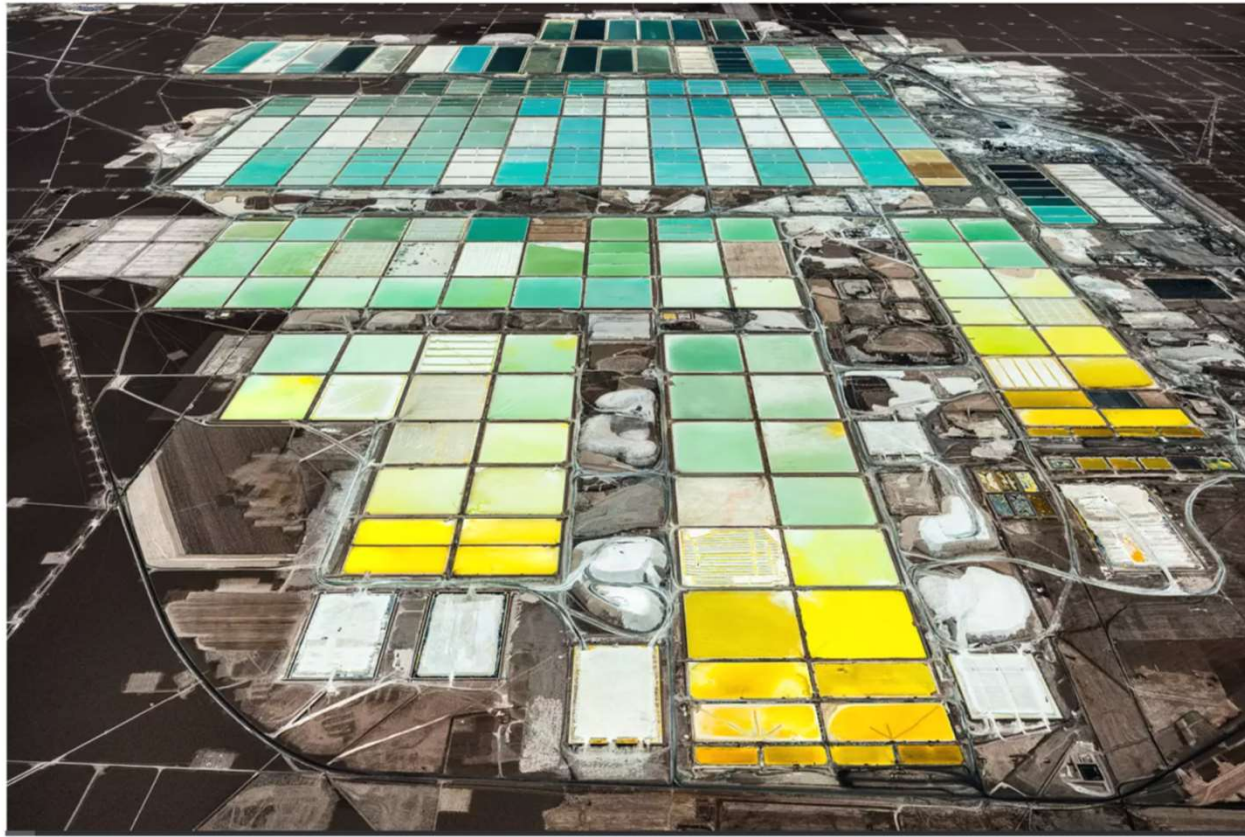
- Global economy average growth rate of 3.4% per year adds a city the size of Shanghai every 4 months to the world population
- SEA electricity demand growing at 2x pace of China
- 40% increase in primary energy met by Renewable Energy
- End of boom years for coal
- Since 2000, coal fired generation added 900GW capacity
- Net additions now to 2040, only 400GW is projected

Energy Storage – Rechargeable Batteries



- Lithium Ion batteries (LIB) – introduced by Sony in 1990
- Light weight, high power density, absence of memory effect
- Tesla’s powerpack – world’s largest, powers 30,000 homes for 1 hour only
- Insufficient for a city entirely dependent on renewables

Renewables – It's Good for the Environment...



Chubb. Insured.