

# Reflecting Environmental Risks in Financial Analysis

Coal-to-Chemical Sector in China as an Example


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March 2018

**S&P Dow Jones  
Indices**

A Division of **S&P Global**


# Background




Internalization of Environmental Costs and Investment Stress Testing: Aluminum Sector in China

March 2017

Supporting Organizations:



中国工商银行  
INDUSTRIAL AND COMMERCIAL BANK OF CHINA



中国金融学会绿色金融专业委员会  
Green Finance Committee, China Society for Finance and Banking

## The Hidden Costs of China's Coal-to-Chemical Sector



S&P Dow Jones Indices  
ESG Analysis

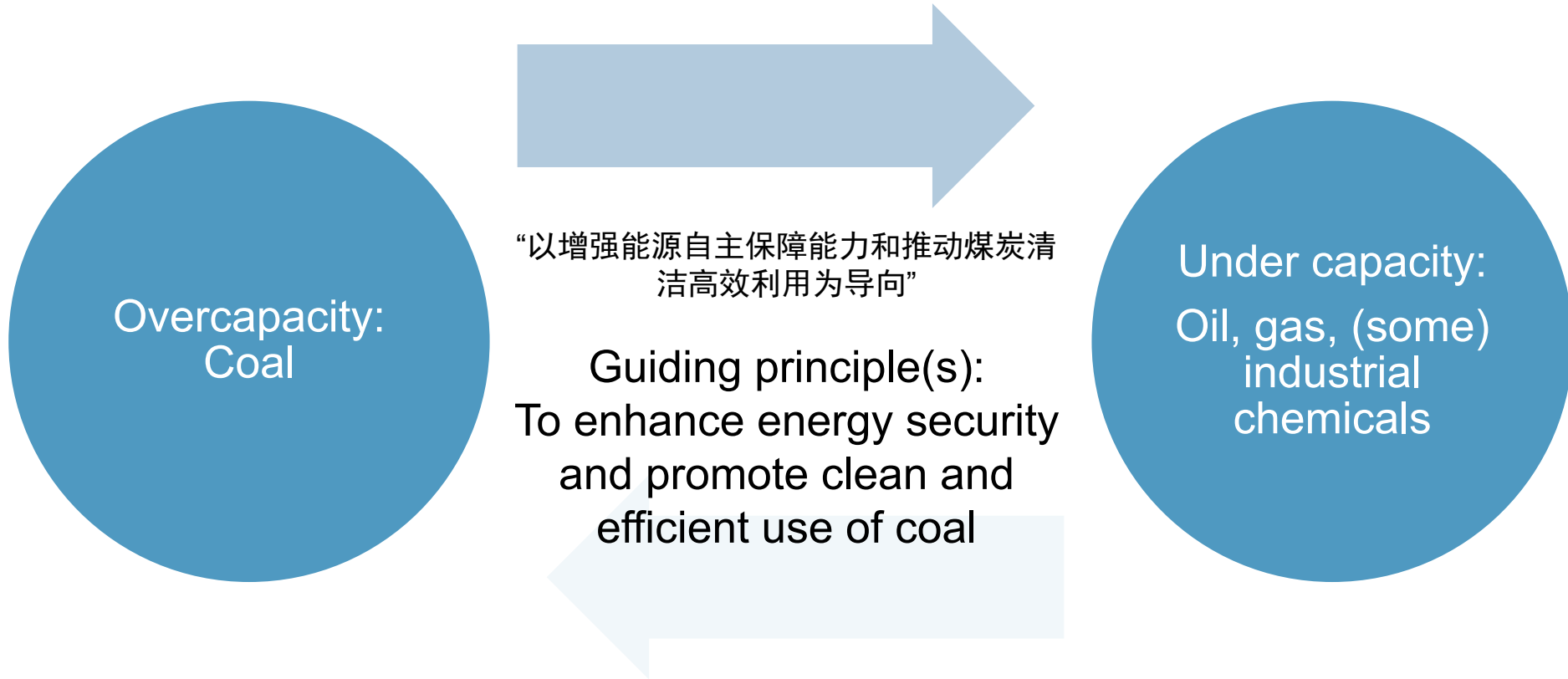
A framework to stress test investments for environmental risks



September 2017

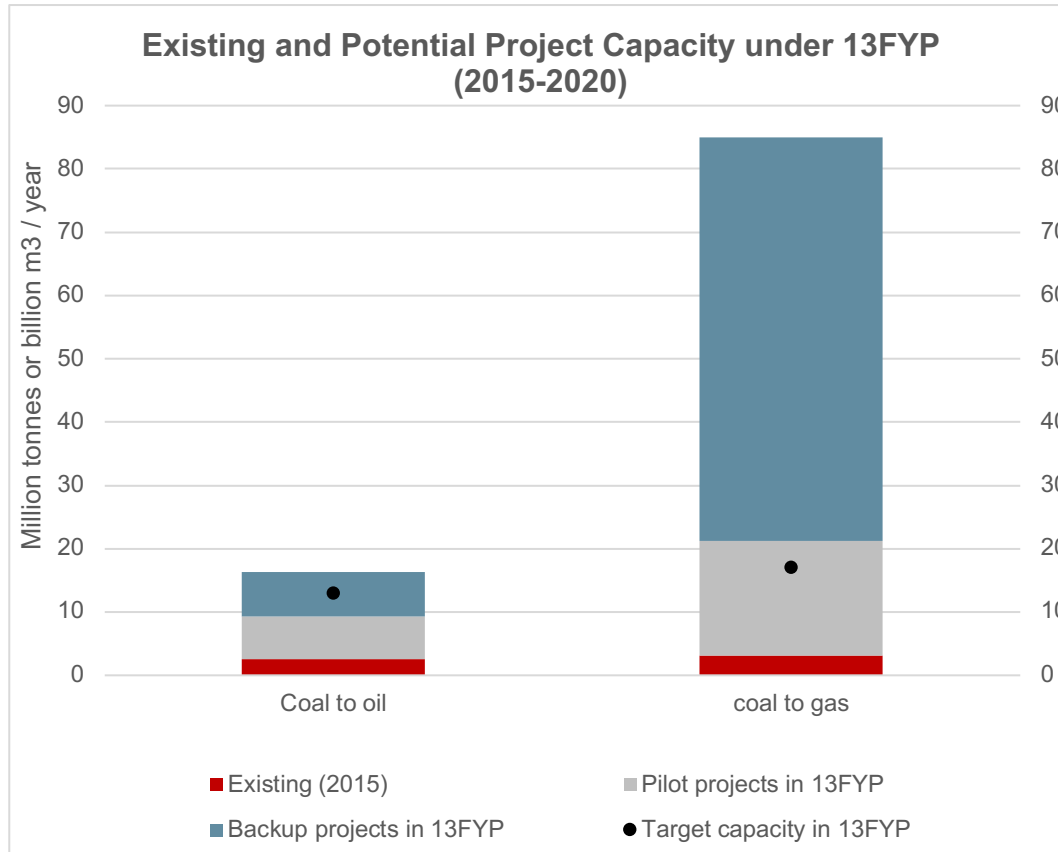
# Background

- Why Coal-to-chemical in China?



# Background

## • Why Coal-to-chemical in China?



Installation capacity –

2017 vs 2016:

Coal to gas: +64.41%

Coal to oil: +15.58%

Coal to olefin: +17.61%

Coal to ethylene: +5.2%

Reference: China Coal Processing & Utilization Association

# Background

## • Is the industry ready for scale up?

**Huge financial pressure** experienced by some of the early demonstration projects

1



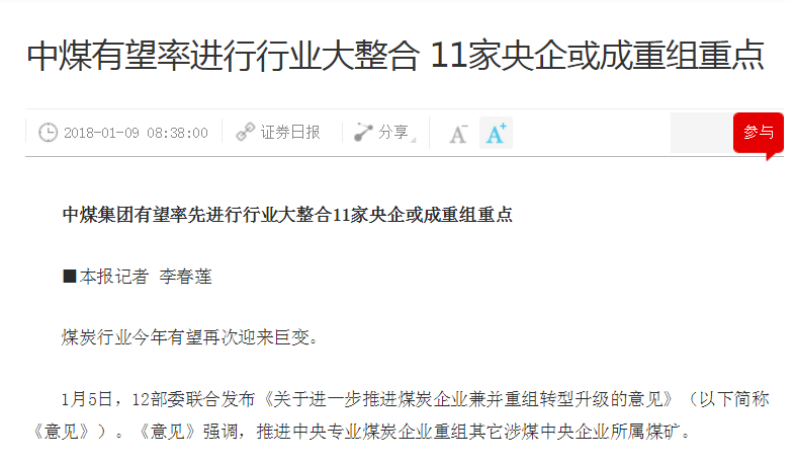
Reference: <http://finance.sina.com.cn/stock/s/2016-07-11/doc-iftwiht3482129.shtml>



Reference: <http://energy.people.com.cn/n1/2017/0809/c71661-29459520.html>

Key state owned coal sector players are under capacity consolidations to create **“big coal majors”**

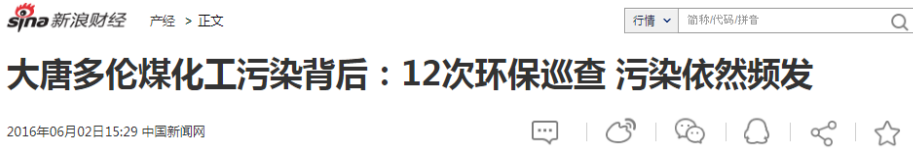
2



Reference: <http://finance.huanqiu.com/chanjing/2018-01/11507399.html>

# Background

## • Environmental risks



**Chemical / wastewater leaks at some of the demonstration projects** – polluting ecosystems around the plant with 1,200 villagers relying on bottle water for daily use.

Reference: <http://finance.sina.com.cn/chanjing/gsnews/2016-06-02/doc-ifxsuypf4808958.shtml>



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Reference: <http://news.sohu.com/s2013/benanxielou/>

## UNEARTHED

FORESTS OCEANS UK CHINA WORLD

### China: CO2 emissions from coal-to-chemical industry set to soar

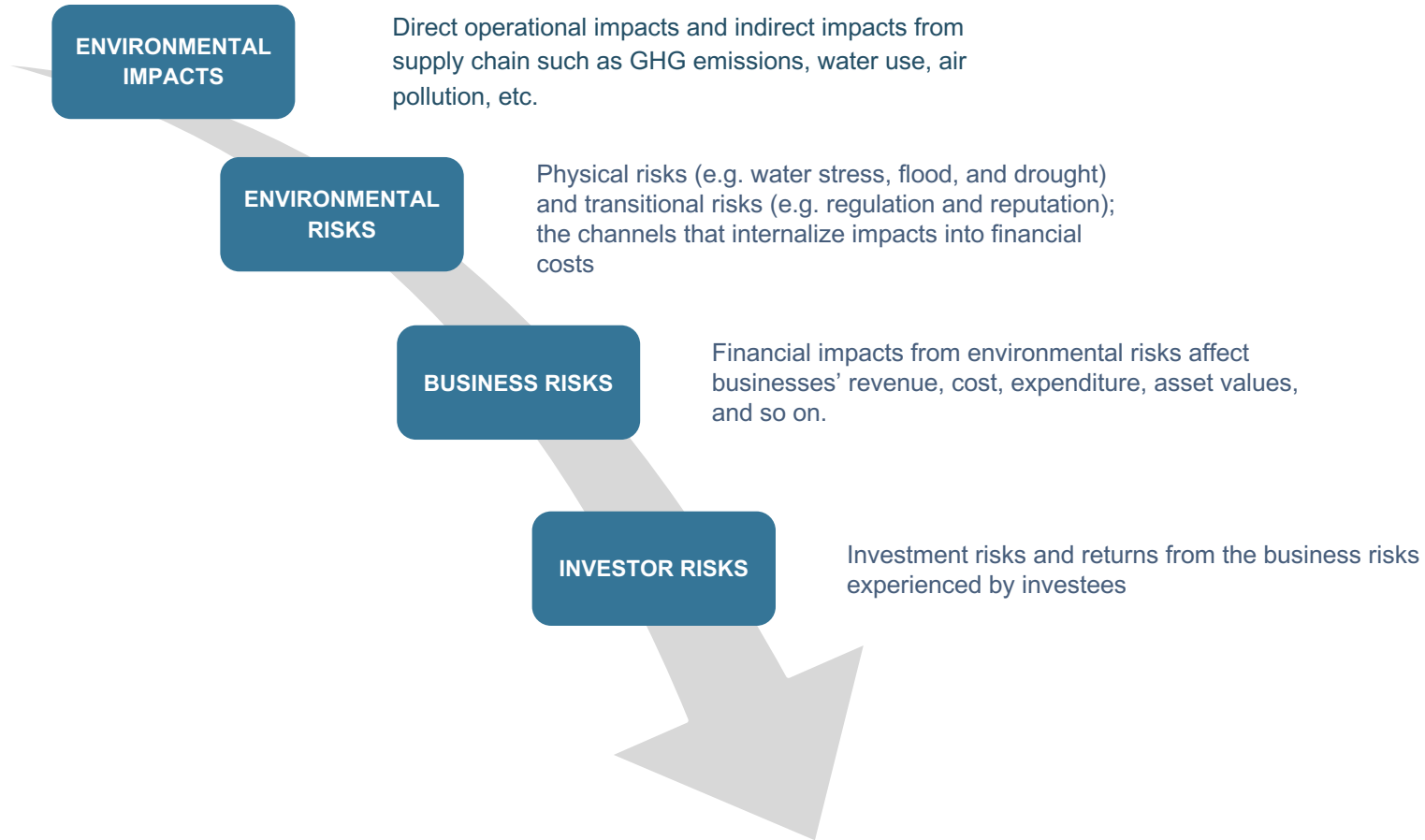
25.04.2017 by Zachary Davies Boren @zdboren



China's coal-to-chemical industry could produce CO2 emissions in excess of 400 million tonnes a year by the end of the decade — a more than fourfold increase from the 90 million emitted in 2015.

Reference: <https://unearthed.greenpeace.org/2017/04/25/china-coal-to-chemical-carbon-emissions/>

# Why does it matter for financial institutions funding these projects?



# No lack of environmental regulations coming up in China

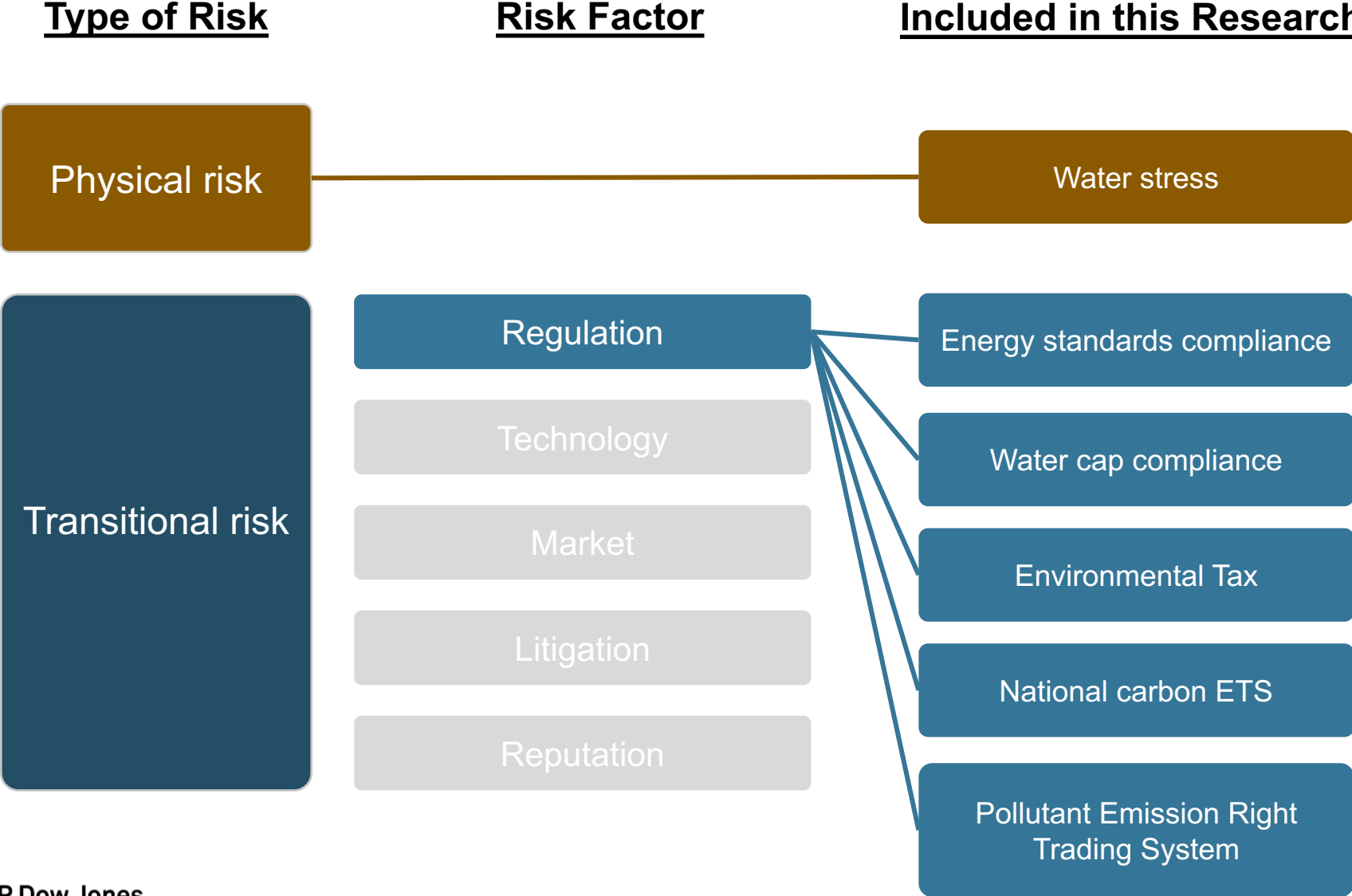
“Stranded assets” may not only be a result of climate change, or only as a long term risk:

Pollutant cap control  
from central government to provincial government

Regulation	Nature	State	Coverage	Emissions covered	Reference
Carbon ETS	Market based	Implementation: 2018	National, companies above scale	GHGs	<a href="http://www.tanpaifang.com/tanjiaoyi/2016/1108/57493.html">http://www.tanpaifang.com/tanjiaoyi/2016/1108/57493.html</a>
Carbon tax	Taxation	Implementation expected to be 2020	National, companies below scale	GHGs	<a href="http://news.xinhuanet.com/finance/2016-08/10/c_129218765.htm">http://news.xinhuanet.com/finance/2016-08/10/c_129218765.htm</a>
Environmental Tax	Taxation	Legislated; Implementation: 2018	National	Air pollutants, water pollutants	<a href="http://www.npc.gov.cn/npc/xinwen/2016-12/25/content_2004993.htm">http://www.npc.gov.cn/npc/xinwen/2016-12/25/content_2004993.htm</a>
Emissions Trading Scheme	Semi-market based	Pilot	Around 50% of all provinces	Air pollutants, water pollutants	<a href="http://www.mof.gov.cn/zhengwuxinxi/zhengcefabu/201408/t20140825_1130901.htm">http://www.mof.gov.cn/zhengwuxinxi/zhengcefabu/201408/t20140825_1130901.htm</a>
Water resource tax	Taxation	Pilot	1 province	Water consumption	<a href="http://szs.mof.gov.cn/zhengwuxinxi/zhengcefabu/201612/t20161216_2483582.html">http://szs.mof.gov.cn/zhengwuxinxi/zhengcefabu/201612/t20161216_2483582.html</a>
Water right trading	Market based	Pilot	Between >13 provinces, among companies and individuals	Water consumption rights	<a href="http://www.tanpaifang.com/shuiquanjiayiyi/2016/07/2254884.html">http://www.tanpaifang.com/shuiquanjiayiyi/2016/07/2254884.html</a>



# Environmental Risks



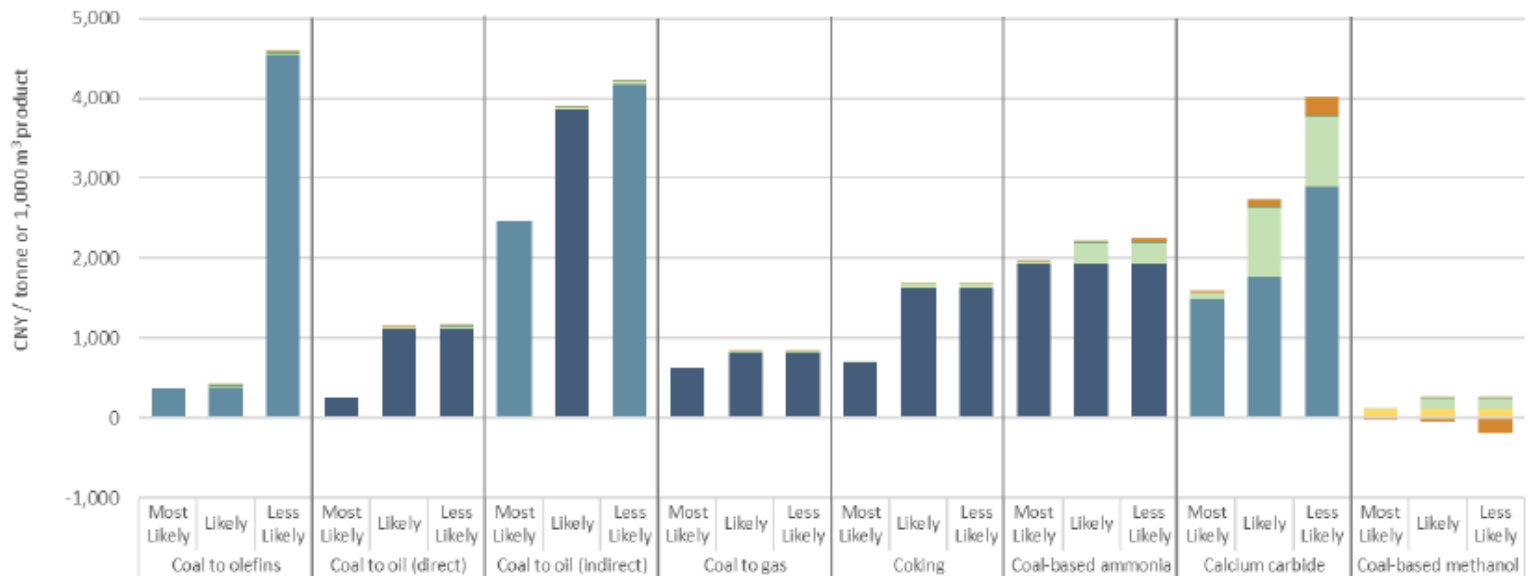
# Scenario Analysis

RISK FACTOR	SCENARIOS		
	MOST LIKELY	LIKELY	LESS LIKELY
Energy standards compliance	Compliance against the “average values” in current standards	Compliance against the “advanced values” in current standards	
Water cap compliance	<i>Compliance against the “average values” in current standards</i>	<i>Apply average of current caps to provinces currently without any cap</i>	Apply “advanced values” in current standards when available and the average of current caps to provinces and products currently without any cap
Environmental tax	Lower limit of tax rate proposed in law	Upper bound of tax rate proposed in law	
Water resource tax	N/A	<i>Assume national implementation based on the Hebei pilot</i>	<i>Assume national implementation with the raise in tax based on the difference between current water resource fees and tax</i>
National carbon ETS	30 CNY / tCO <sub>2</sub> e	65 CNY / tCO <sub>2</sub> e (average of initial price range 30 - 100 CNY / tCO <sub>2</sub> e)	200 CNY / tCO <sub>2</sub> e
	100% free allocation for cap based on “average energy intensity” for calcium carbide, methanol, and ammonia industries		
Pollutant Emission Right Trading System	N/A	Assume national implementation at average price of pilot schemes in Inner Mongolia, Shaanxi, Hunan, Jiangsu, and Gansu	
Water stress	<i>Water stress up to 2020</i>	<i>Water stress up to 2030</i>	

# Key Findings

- Risks may **increase exponentially** in the future under higher regulatory stress
- Environmental risks ranges from **35% - 64% of these products' unit price** on average
- Majority of the risks come from regulatory compliance, which highlights the key role of policymakers and the importance of ongoing due diligence

**EXHIBIT 11: ENVIRONMENTAL RISK INTENSITY BY PRODUCTS AND SCENARIOS, NATIONAL AVERAGE**



# Key Findings

- Regional variation in risks is mainly driven by water risks
- Most of the high risk areas overlaps with production hot spots

EXHIBIT 14: TOP FIVE REGIONAL ENVIRONMENTAL RISK INTENSITIES IN THE “LIKELY” SCENARIO

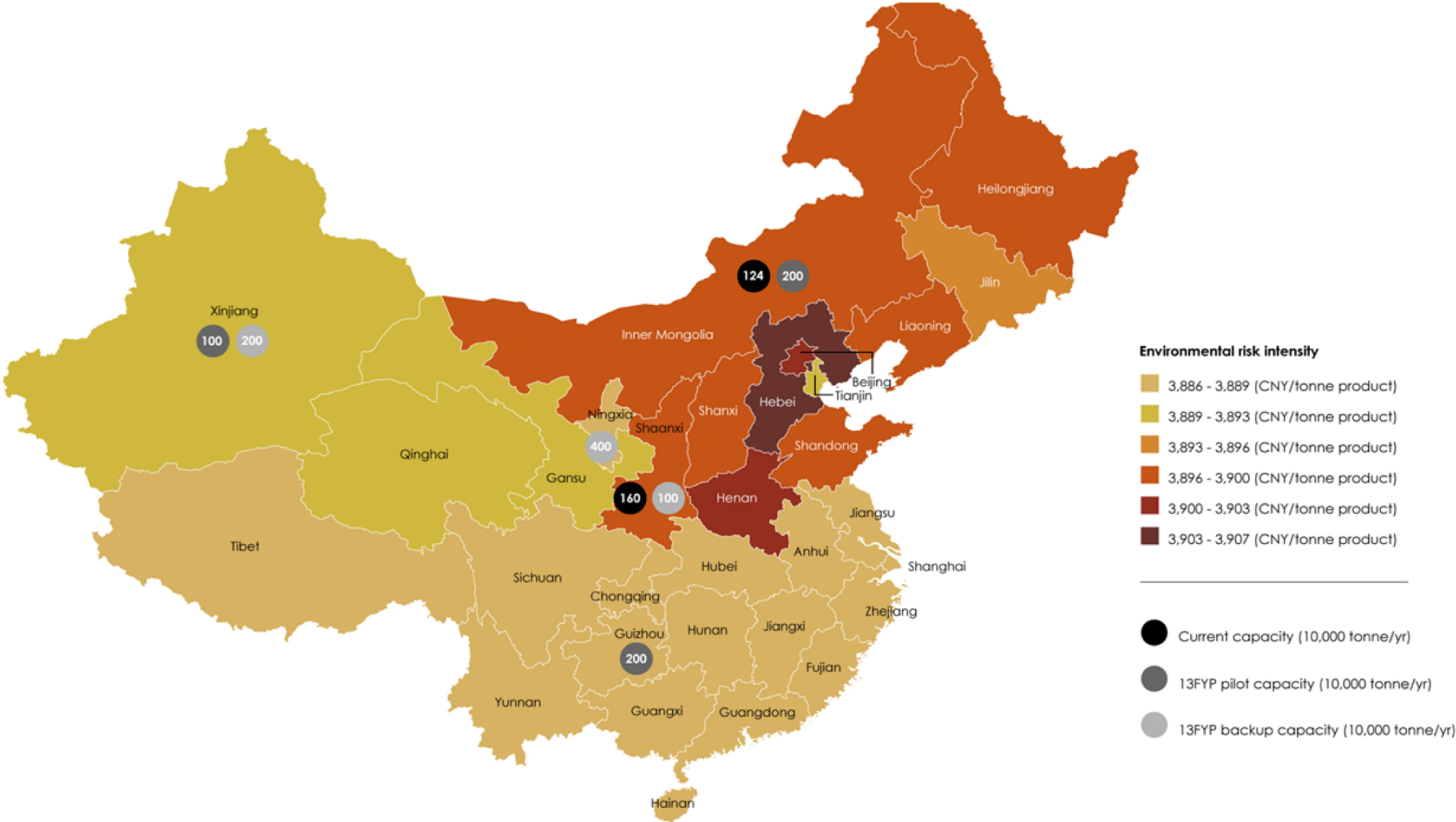
PRODUCT	1	2	3	4	5
Coal to gas, coal to oil, coal to olefins, coal-based ammonia, coking	Hebei	Henan	Beijing	Inner Mongolia	Shanxi
Coal-based methanol	Beijing	Hainan	Tianjin	Shandong	Hebei
Calcium carbide	Hebei	Inner Mongolia	Shanxi	Liaoning	Shanxi

EXHIBIT 15: TOP FIVE PROVINCES FOR COAL-TO-CHEMICAL PRODUCTION IN 2015

PRODUCT	1	2	3	4	5
Coal to gas	Inner Mongolia	Xinjiang	N/A	N/A	N/A
Coal to oil	Shaanxi	Inner Mongolia	Yunnan	Shanxi	Ningxia
Coal to olefins	Shaanxi	Inner Mongolia	Ningxia	Ningxia	Zhejiang
Coal-based ammonia	Shandong	Henan	Shanxi	Hubei	Sichuan
Coal-based methanol	Inner Mongolia	Shandong	Ningxia	Shaanxi	Henan
Coking	Shanxi	Hebei	Shandong	Shaanxi	Inner Mongolia
Calcium Carbide	Inner Mongolia	Xinjiang	Ningxia	Shaanxi	Henan

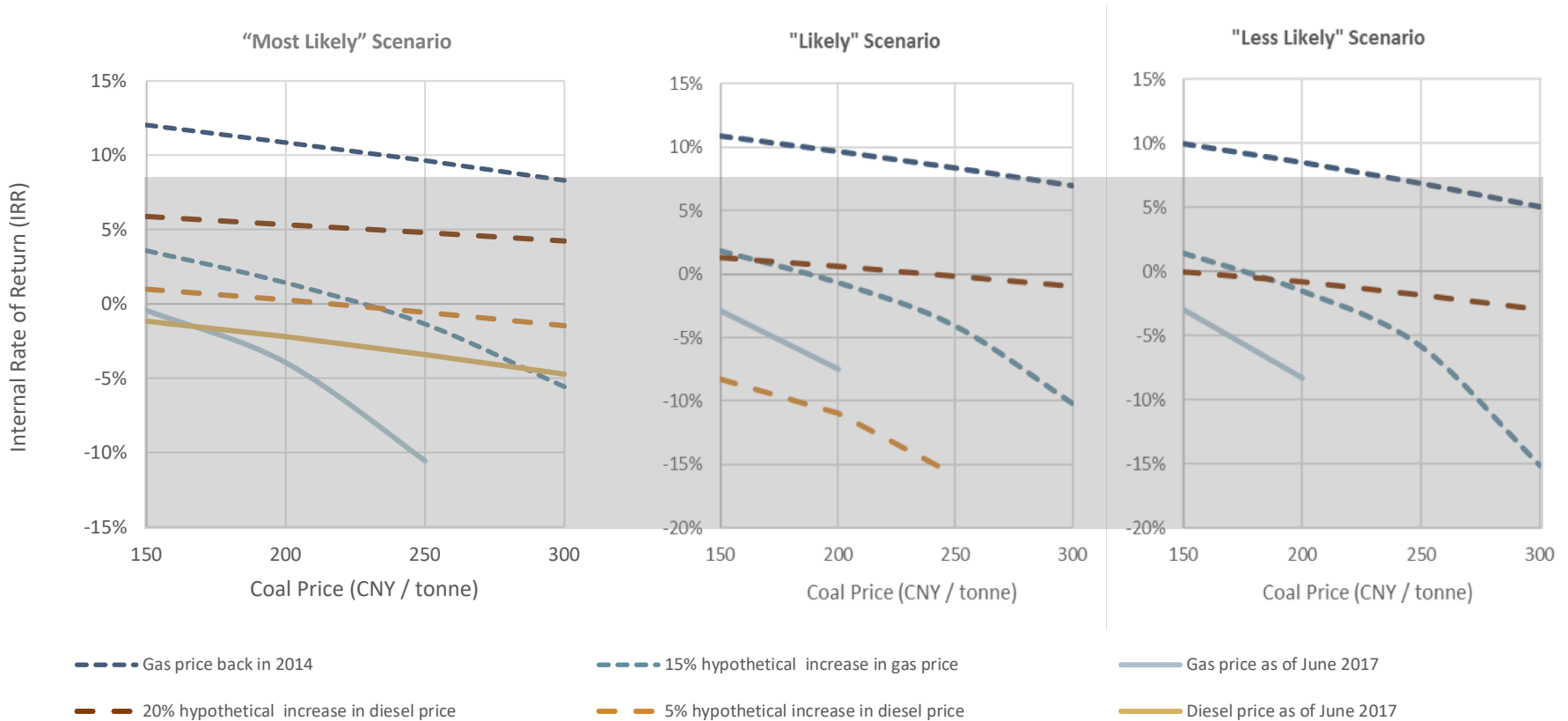
# Key Findings

- The growth target under 13FYP implies significant increase in risks



# Key Findings

## SENSITIVITY ANALYSIS OF IRR ACROSS DIFFERENT SCENARIOS



# Recommendations

## For Policy Makers

- Measures to promote robust enforcement of existing policies and regulations
- Consider revising current regulations on water, energy, carbon, tax and fees, and so on to fully internalize environmental externalities

# Recommendations

## For Investors

- Prioritize environmental risk assessment for these hotspots in their portfolios and incorporate the environmental risk-adjusted financial metrics into their considerations
- Consider using scenario analysis to assess the possibility and potential scale of such changes and incorporate this practice into regular risk assessment procedures
- Recognize the importance of due diligence for its environmental risk screening and management function



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