

# Reflecting Environmental Risks in Financial Analysis

Coal-to-Chemical Sector in China as an Example

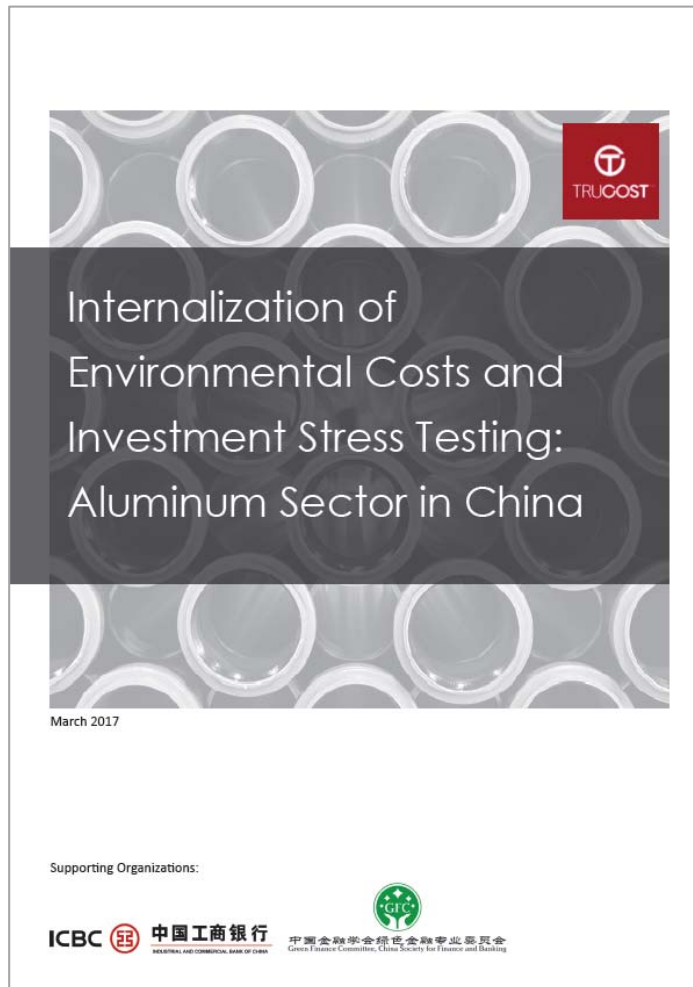
**Derek Ip,**  
Senior Research Analyst, Financial Institutions  
Trucost, Part of S&P Dow Jones Indices

March 2018

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# Background

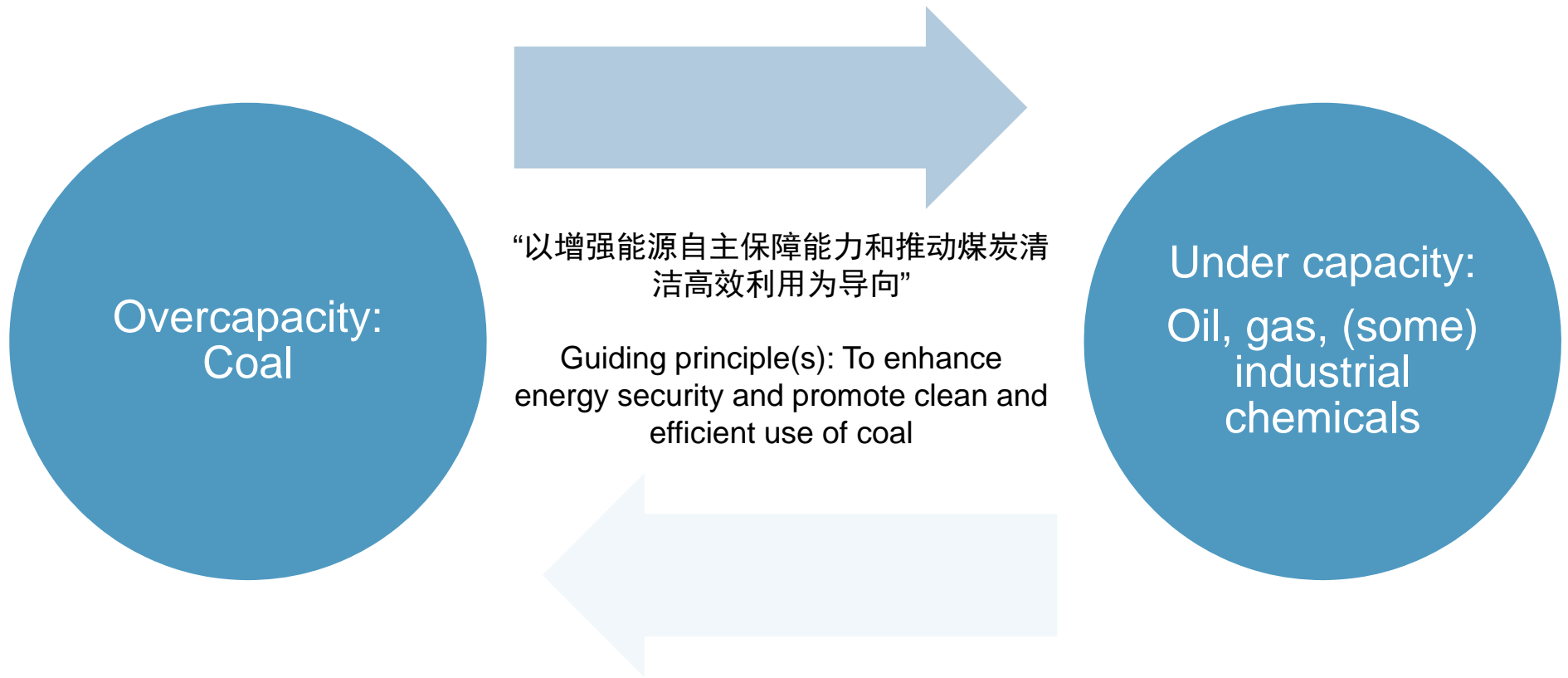


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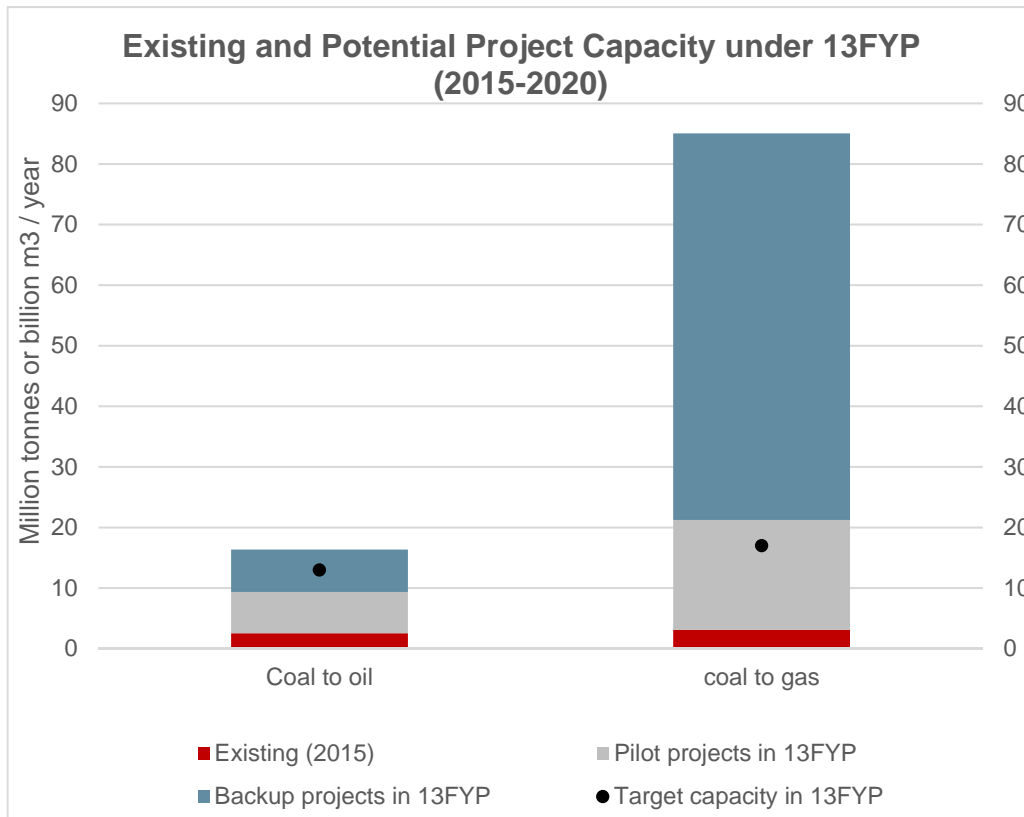
# Background

- Why Coal-to-chemical in China?



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- Why Coal-to-chemical in China?



Installation capacity –

2017 vs 2016:

Coal to gas: +64.41%

Coal to oil: +15.58%

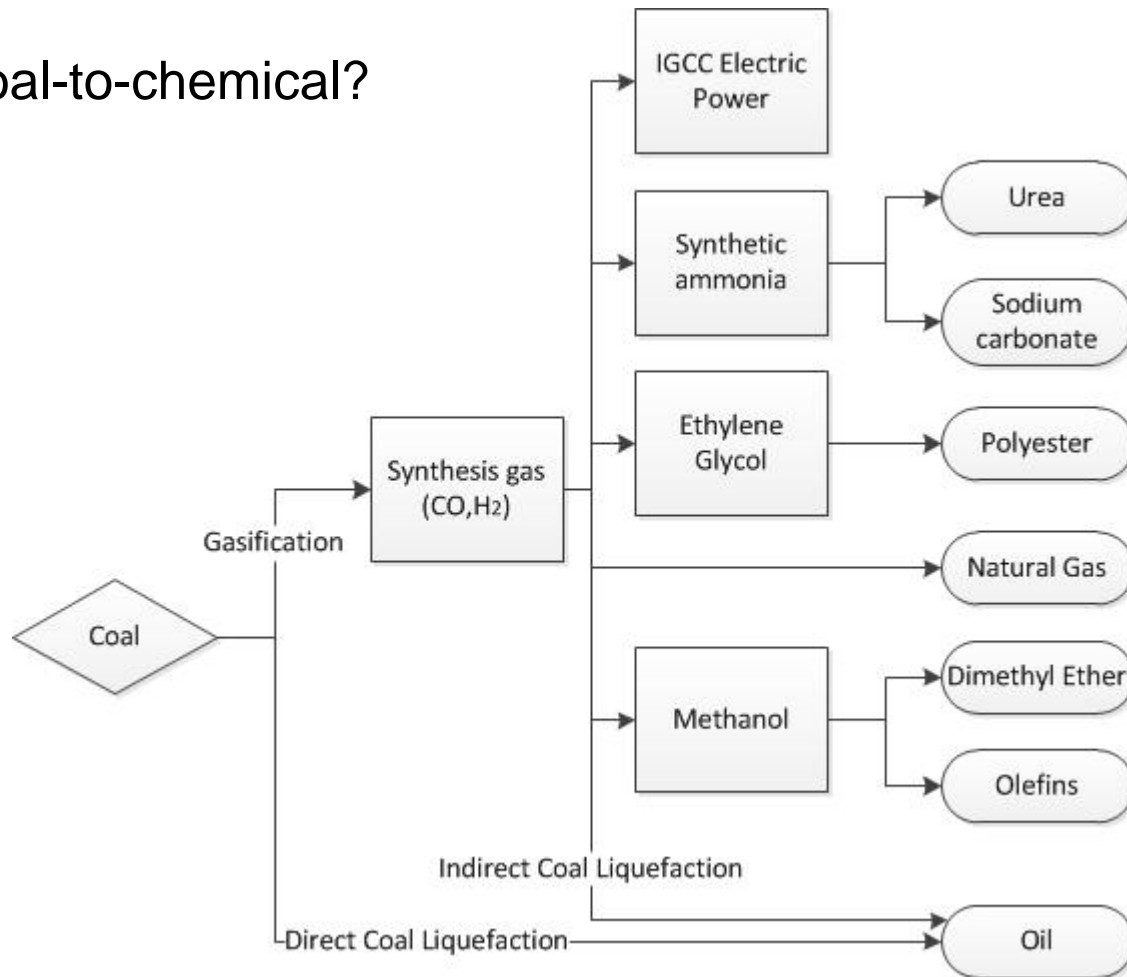
Coal to olefin: +17.61%

Coal to ethylene: +5.2%

Reference: China Coal Processing & Utilization Association

# Background

- What is coal-to-chemical?



Source: <https://seekingalpha.com/article/850891-a-new-vision-the-potential-for-coal-gasification-and-coal-chemical-industry-development-in-mongolia>

# Background

- Is the industry ready for scale up?

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

1

sina 新浪财经 证券 > 正文

行情 输入代码/拼音

## 大唐发电：煤化工两年亏掉近百亿 母公司1元接“烂摊子”

2016年07月11日07:03 投资快报



Reference: <http://finance.sina.com.cn/stock/s/2016-07-11/doc-ixftwiht3482129.shtml>



人民网 >> 人民网络传播

## 煤制油行业现亏损 专家称应严格控制示范单位数量

2017年08月09日09:40 来源：经济参考报

分享到： 人 市 绿 星 图

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

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

2

## 中煤有望率先进行行业大整合 11家央企或成重组重点

2018-01-09 08:38:00

证券日报

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中煤集团有望率先进行行业大整合11家央企或成重组重点

■本报记者 李春莲

煤炭行业今年有望再次迎来巨变。

1月5日，12部委联合发布《关于进一步推进煤炭企业兼并重组转型升级的意见》（以下简称《意见》）。《意见》强调，推进中央专业煤炭企业重组其它涉煤中央企业所属煤矿。

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

# Background

- Environmental risk associated

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行情 简体/繁体/拼音

## 大唐多伦煤化工污染背后：12次环保巡查 污染依然频发

2016年06月02日15:29 中国新闻网



**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-afxsuypf4808958.shtml>



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

## UNEARTHED

FORESTS

OCEANS

UK

CHINA

WORLD

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



25.04.2017 by Zachary Davies Boren

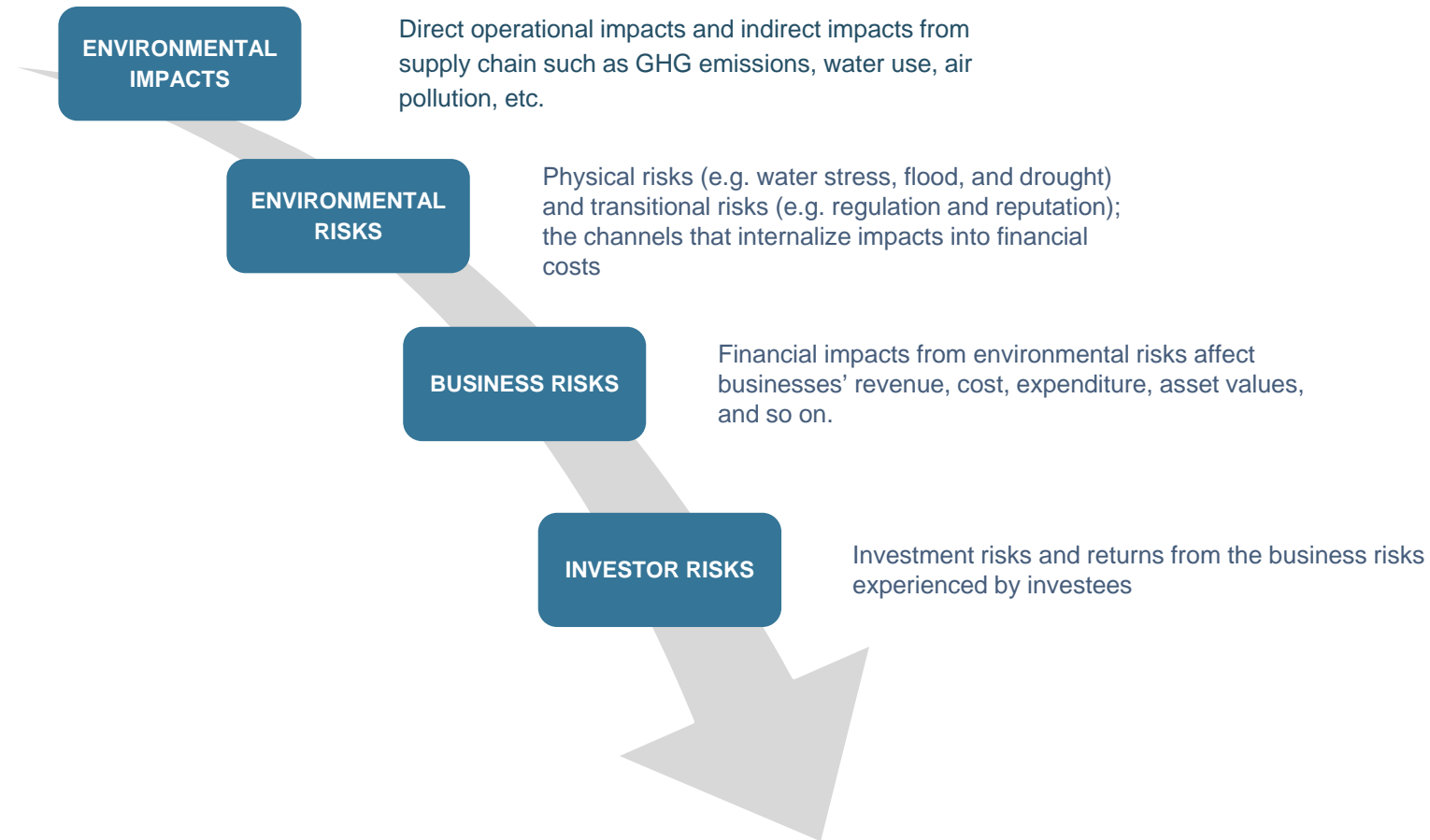


China's coal-to-chemical industry could produce CO2 emissions in excess of 400 million tonnes a year by the end of the decade — a more than fourfold increase from the 90 million emitted in 2015.

Reference:

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

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



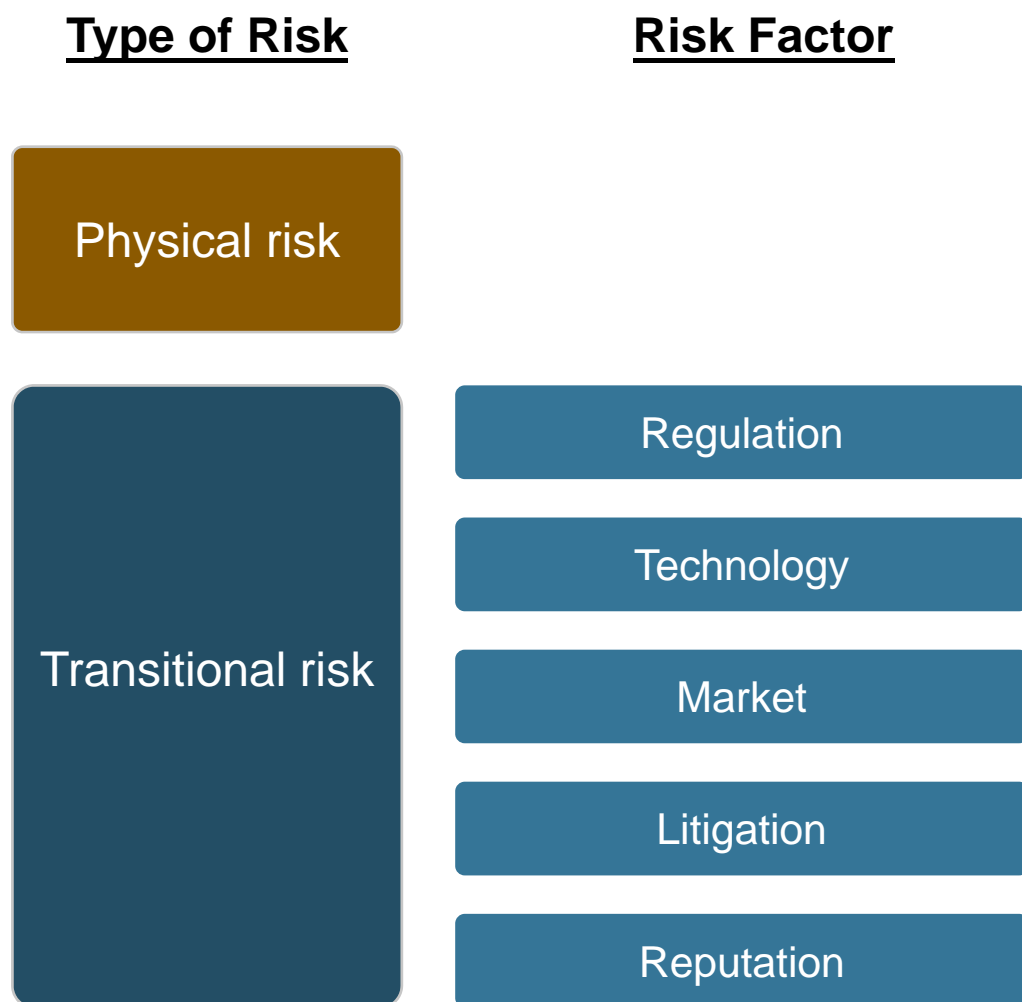


# There are no lack of environmental regulations coming up in China

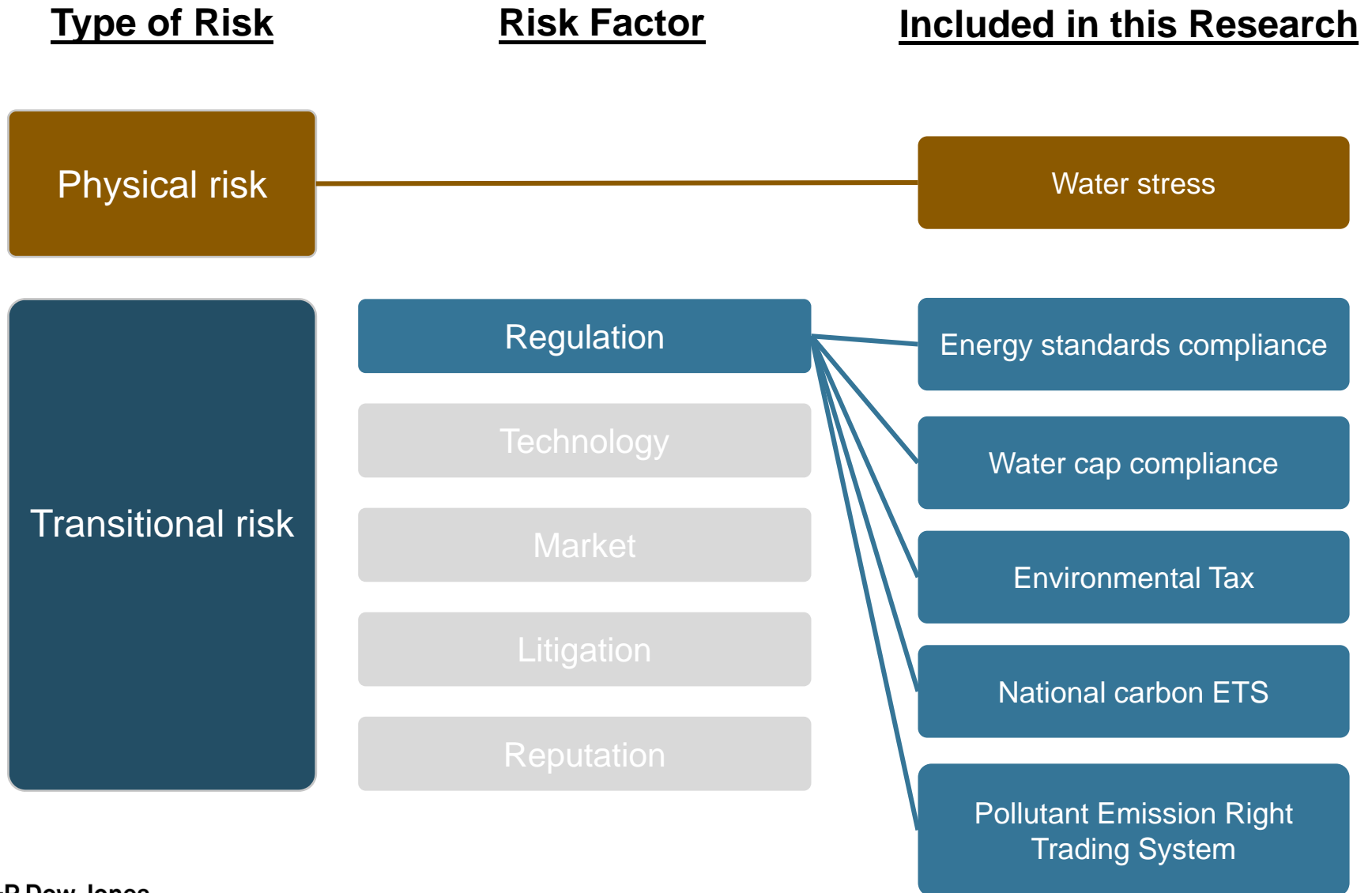
“Stranded assets” may not only be a result of climate change, or only as a long term risk:

<div>Pollutant cap control</div> <div>from central government to provincial government</div>	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



# Environmental Risks



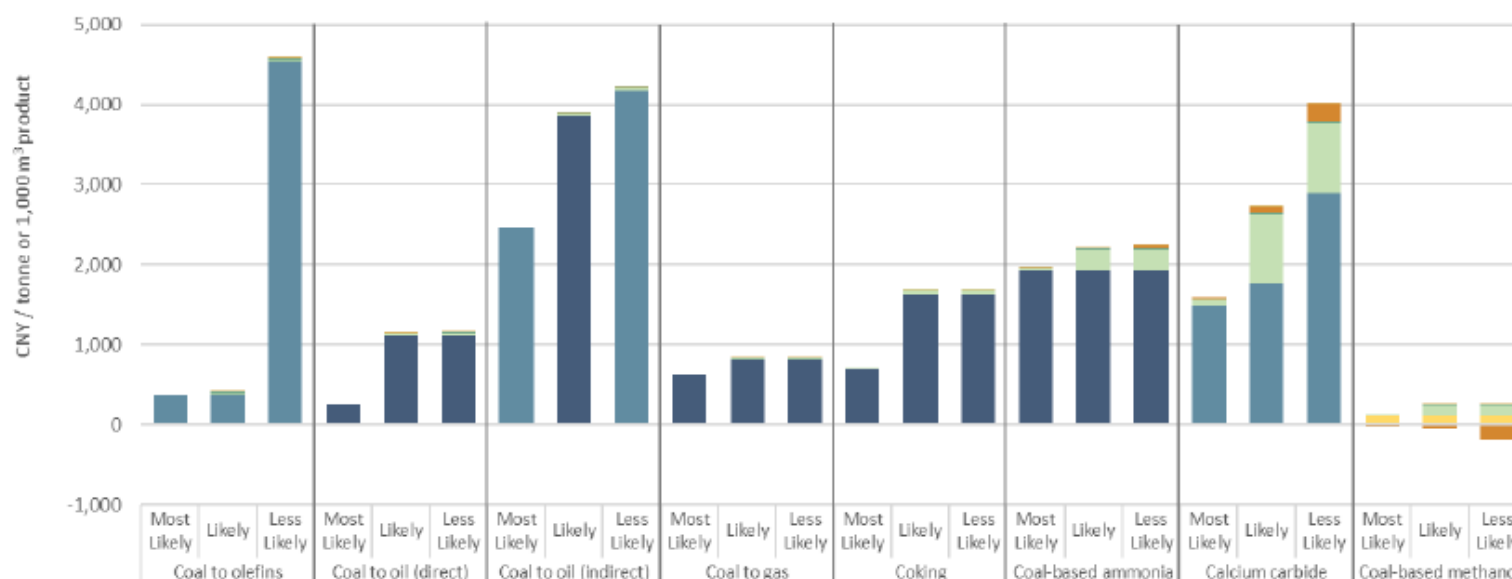
# Scenario Analysis

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

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



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# Key Findings

- Majority of the risks come from regulatory compliance, which highlights the key role of policy makers and the importance of ongoing due diligence



# 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
- Such risks accounts for a considerable portion of investment in these projects, with potential to increase significantly in the future

**EXHIBIT 17: TOTAL ENVIRONMENTAL RISK VERSUS INVESTMENT FOR PROJECTS OPERATING IN 2015 AND PROPOSED IN 13FYP, 100 MILLION CNY**

PRODUCT	SCOPE OF PROJECTS ESTIMATED	TOTAL CLIAMTE RISKS <sup>1</sup>			TOTAL INVESTMENT
		VERY LIKELY	LIKELY	LESS LIKELY	
Coal to oil	2015	10	25	26	656
	2015 + pilot	90	151	162	3,513
	2015 + pilot + backup	169	274	295	3,377
Coal to gas	2015	12	15	16	385
	2015 + pilot	80	106	106	1,559
	2015 + pilot + backup	307	406	448	5,645

**Ratio Legend:**

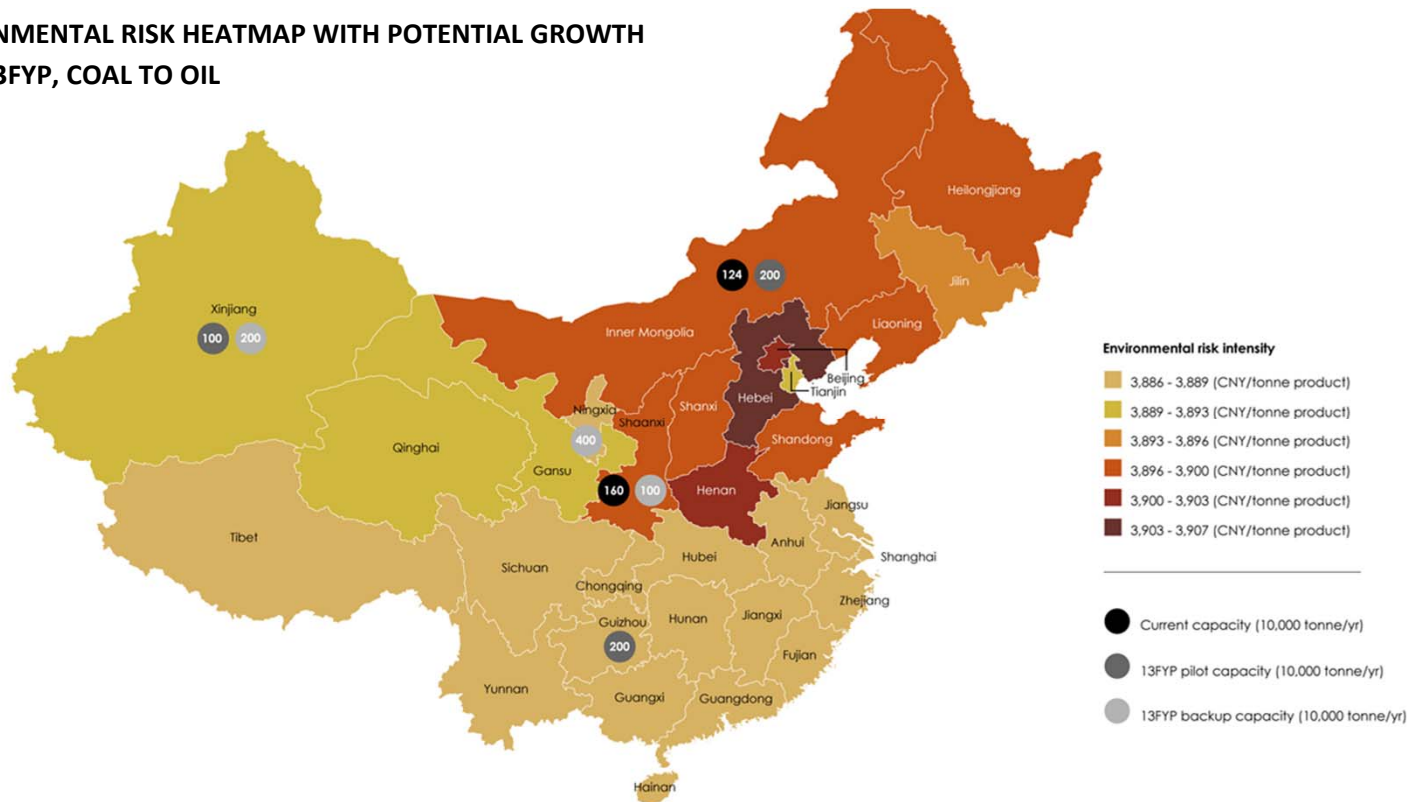
> 8%	6% - 8%	4% - 6%	2% - 4%	< 2%
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# Key Findings

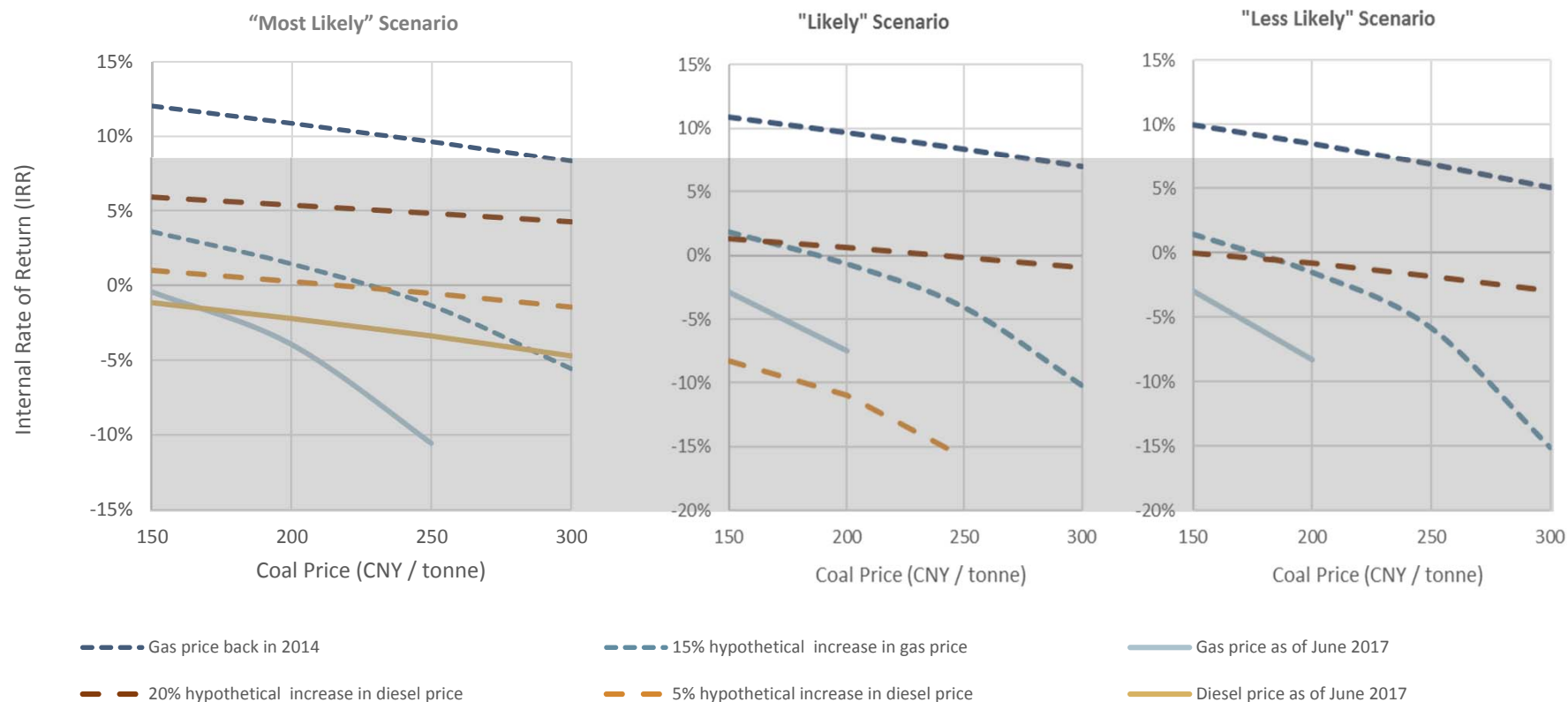
- The growth target under 13FYP implies significant increase in risks

ENVIRONMENTAL RISK HEATMAP WITH POTENTIAL GROWTH  
FROM 13FYP, COAL TO OIL



# 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

## 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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