



# *Geothermal District Heating Building on the Icelandic Experience*

地热能区域供热  
冰岛的清洁供暖经验

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# Something is Wrong

## 我们的世界怎么了？



Seoul, South Korea,  
2017 韩国



Almaty, Kazakhstan 2017 哈萨  
克斯坦



Kathmandu, Nepal, 2017  
尼泊尔



Ulaanbaatar Mongolia, 2017  
蒙古



Teheran, Iran, 2017 伊  
朗



New Delhi, India, 2017  
印度



Beijing, China, 2017  
中国



Lahore, Pakistan, 2017 巴  
基斯坦

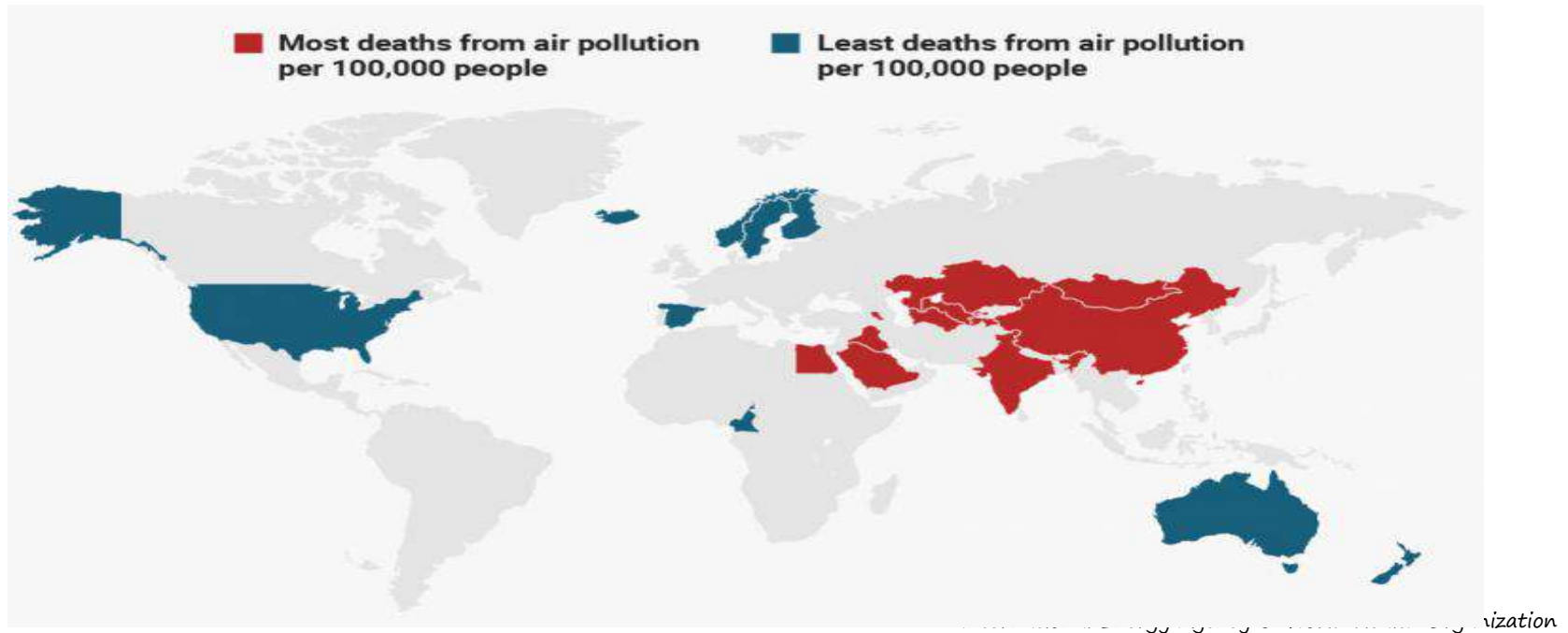


Ankara, Turkey, 2017  
土耳其

# Air Pollution & Public Health

## 空气污染与公众健康

Countries with the Most and Least Deaths from Air Pollution  
空气污染问题严重与空气质量较好的国家



Air Pollution costs more than USD 5 trillion/year in Social Welfare\*

空气污染每年消耗掉5万亿美元的社会福利经费

Air Pollution, claims more than 6,5 million lives a year\*

空气污染每年夺走超过650万人的生命

\*The Lancet 2017

\*\* The World Health Organization 2016

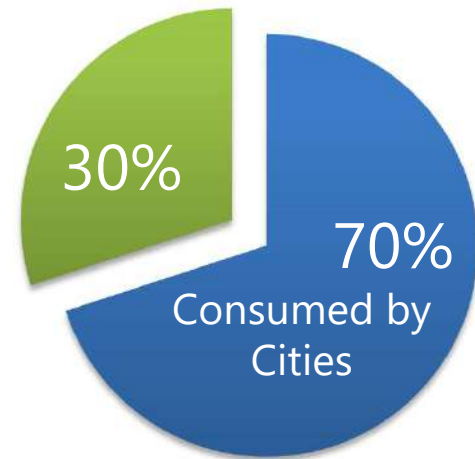
# Heating & Cooling Cities and Air Pollution

## 城市中的供暖、制冷与空气污染

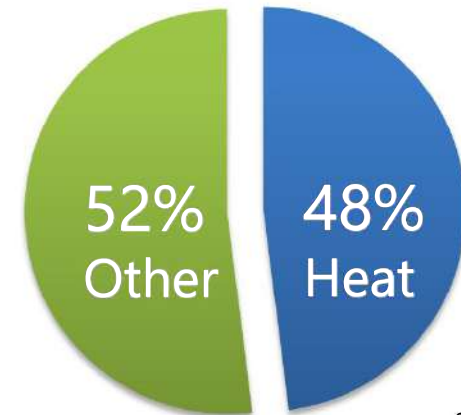
### Heating and Cooling Cities, Major Contributors to Air Pollution and Greenhouse Emissions

供暖与制冷是城市空气污染与温室气体排放的主要贡献者

- 70% of all energy globally is consumed by cities  
全球能源中的70%被城市所消耗
- 60% of the world's population will live in cities by 2030  
到2030年，全世界60%人口将会居住在城市中
- Around 50% of all Energy Generated is for Heat Generation 近50%的能源消耗于供暖与制冷



Source IEA



Source NEA of Iceland

Total Global Energy Usage  
全球能源使用情况

# Zero Emission Cities

## 零排放城市

*Heating & Cooling Cities is the world's largest energy challenge*

供暖与制冷是我们面临的最大的能源挑战

*Nothing is as effective in reducing air pollution & greenhouse emissions than replacing fossil fuels as an energy source with renewable sources*

用可再生能源替代化石能源是减少空气污染与温室气体排放的最为行之有效的办法

*Geothermal Energy is a renewable, baseload and profitable solution*

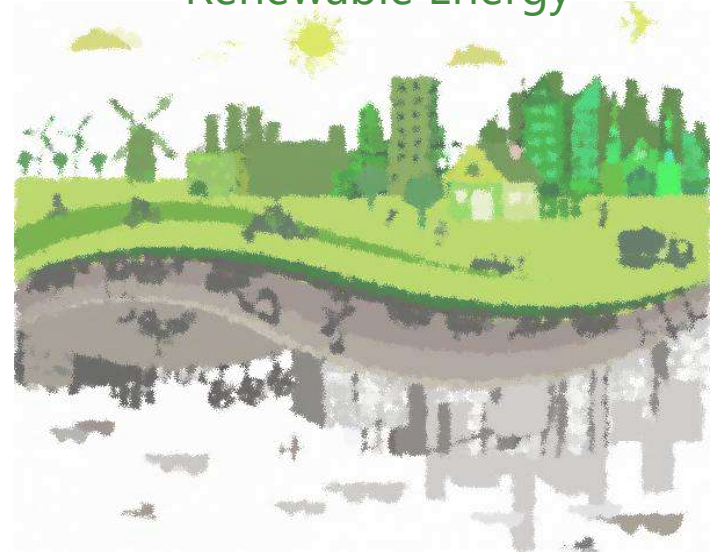
地热能是一种可再生、可带基荷以及可盈利的解决方案

*Zero Emissions can be achieved*

零排放城市是可以实现的！



Renewable Energy



Fossil Fuels





# Reykjavik Before Geothermal Heating

## 利用地热能以前的雷克雅未克



# Reykjavik Today

## 今天的雷克雅未克

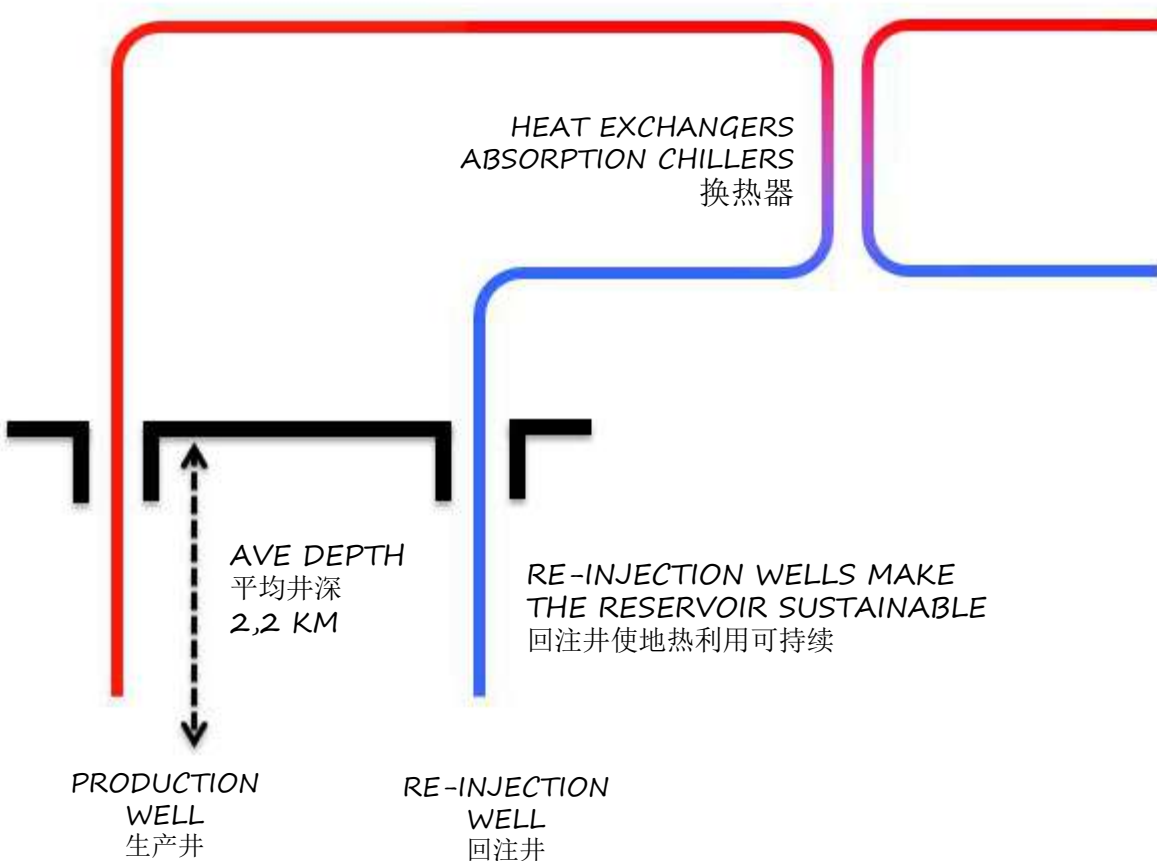


# Heating & Cooling Cities with Geotherm

## 地热能驱动的城市供暖与制冷



Up To 80 km 长至80公里





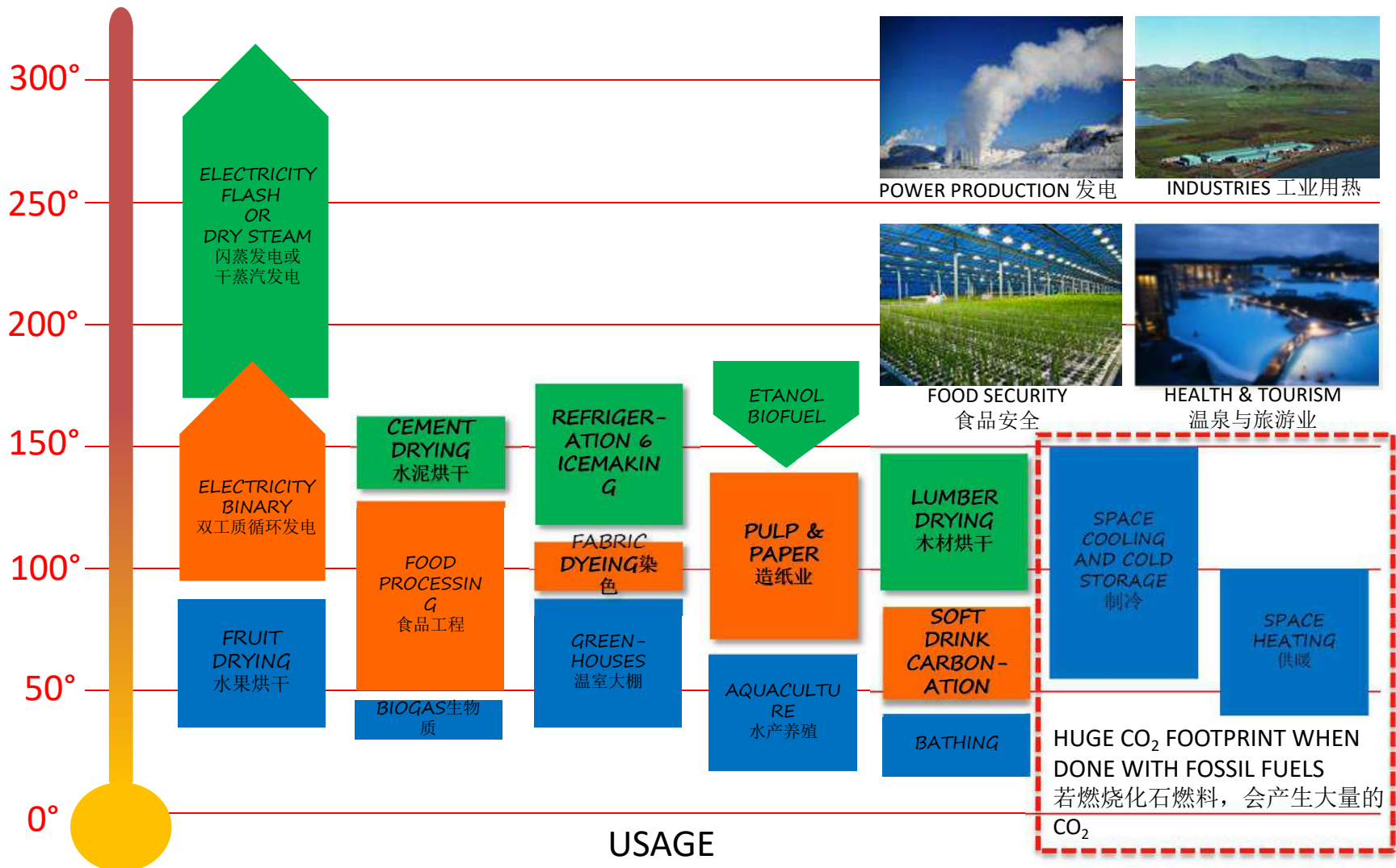
# Geothermal Energy Applications

## 多种地热能利用方式



# Geothermal Energy Applications

## 多种地热能利用方式



# Iceland's Global Leadership in Geothermal

## 冰岛的全球地热领导力

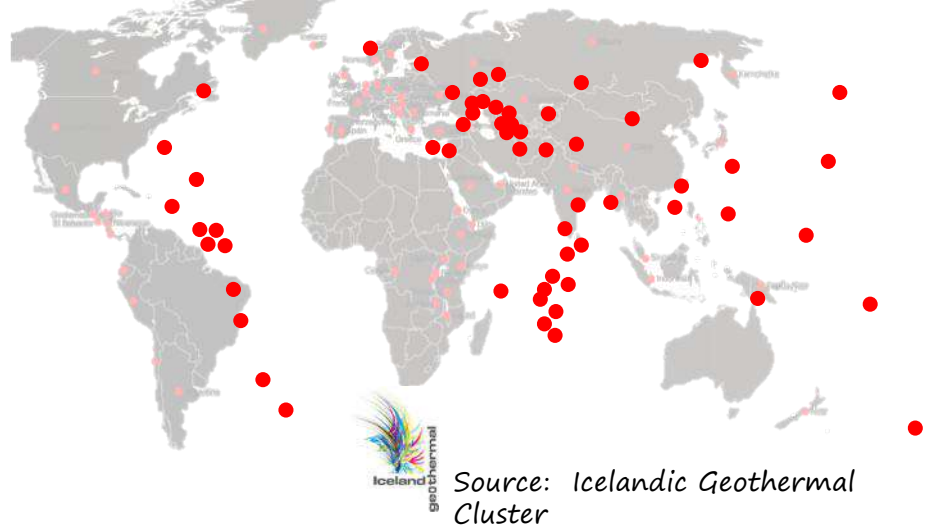


### The World's Most Successful Geothermal Country

#### 世界上最成功的地热之国

- Most homes and buildings heated with geothermal  
大多数的建筑依靠地热供暖
- National savings due to geothermal district heating are up to 7% of GDP  
由于地热供暖，国民储蓄增加达GDP的7%
- Public health has dramatically improved with geothermal replacing coal  
地热替代燃煤后，公民健康水平显著提高
- 800 Scientists and engineers contributing to projects all over the world  
800名科学家与工程师在为全世界的项目做出贡献
- United Nations Geothermal University is located in Iceland  
联合国地热大学坐落于冰岛
- The World Bank chose Iceland as its partner in the Global Geothermal Partnership  
世界银行选择冰岛作为全球地热合作伙伴

### Countries using Iceland's Expertise



The Global Community looks to Iceland for Geothermal Knowledge

全世界将目光投向冰岛，冰岛拥有卓越的地热开发技术

The Game changer for Iceland was not Geothermal Power Generation but District Heating  
地热供暖可以改变世界，而非地热发电

SQE in China is the first large scale project outside Iceland.  
中石化绿源地热开发项目是冰岛在海外的第一个大规模开发项目



# Iceland – China Geothermal Cooperation

## 中冰地热合作





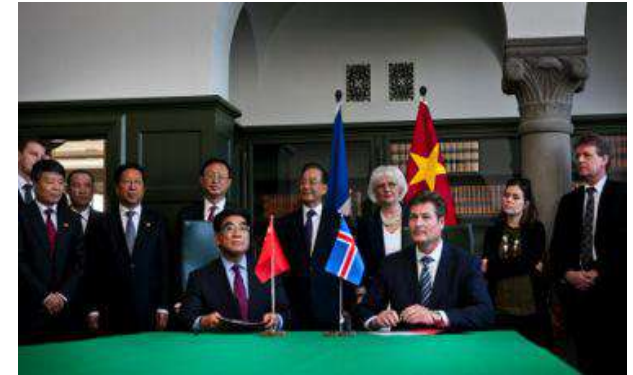
# Arctic Green Energy in China

## 极地绿色能源在中国



### Sinopec Green Energy 中石化绿源地热

- *World's largest and fastest growing geothermal heating company, established in 2006*  
世界上最大，也是增长最快的地热供暖企业，成立于2006年
- *Built on Icelandic geothermal knowledge*  
基于冰岛的地热利用技术
- *Profitable since 2009*  
自2009年以来盈利
- *Industry leader in China in technology, owner of the most valuable industry patents*  
中国地热行业的领导者，拥有最有价值的行业专利
- *Numerous recognitions and awards*  
获得众多的表彰与奖励
- *Owner and developer of the Xiongxin Model which is a national showcase in China for geothermal*  
雄县模式的所有者和开发者，是中国地热的国家展示
- *Rapid expansion over next years in China*  
在中国未来几年快速增长
- *Expanding from geothermal only to embrace other renewables*  
从地热发展到多种可再生能源相结合



*"With the support of the Chinese and Icelandic governments Sinopec will enhance the cooperation with Arctic Green Energy, in a bid to build our joint venture into the top geothermal company in the whole world"*

*Fu Chengyu, Chairman of Sinopec Group*  
2012

“在中国和冰岛政府的支持下，中石化将加强与极地绿色能源的合作，以建立我们的全球顶级地热合资企业”



傅成玉，原



51%

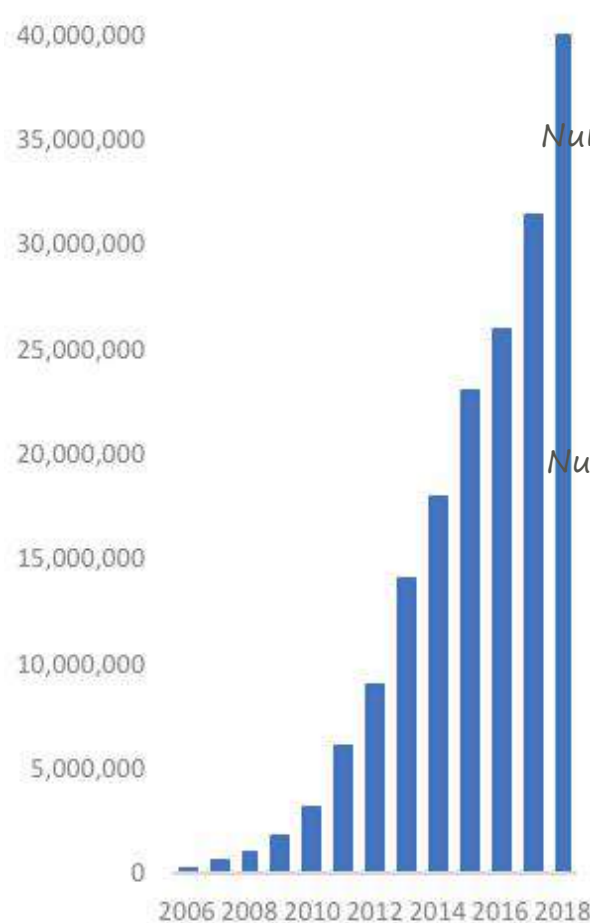
49%



中石化绿源地热能开发有限公司  
SINOPEC GREEN ENERGY GEOTHERMAL DEVELOPMENT CO., LTD.

# Sinopec Green Energy Factsheet

## 中石化绿源概况



Heating Capacity  
供热能力

40,000,000 m<sup>2</sup>

Number of Cities and Counties  
城镇数量

44

Number of Wells Drilled  
地热井数量

507

Number of Heat Centrals  
换热中心数量

328

Number of Patents Registered  
注册专利数量

50

GWth Generated  
供热量

3.65 GWth

MWe Generated  
发电量

15 MWe

CO<sub>2</sub> Saved  
二氧化碳减排量

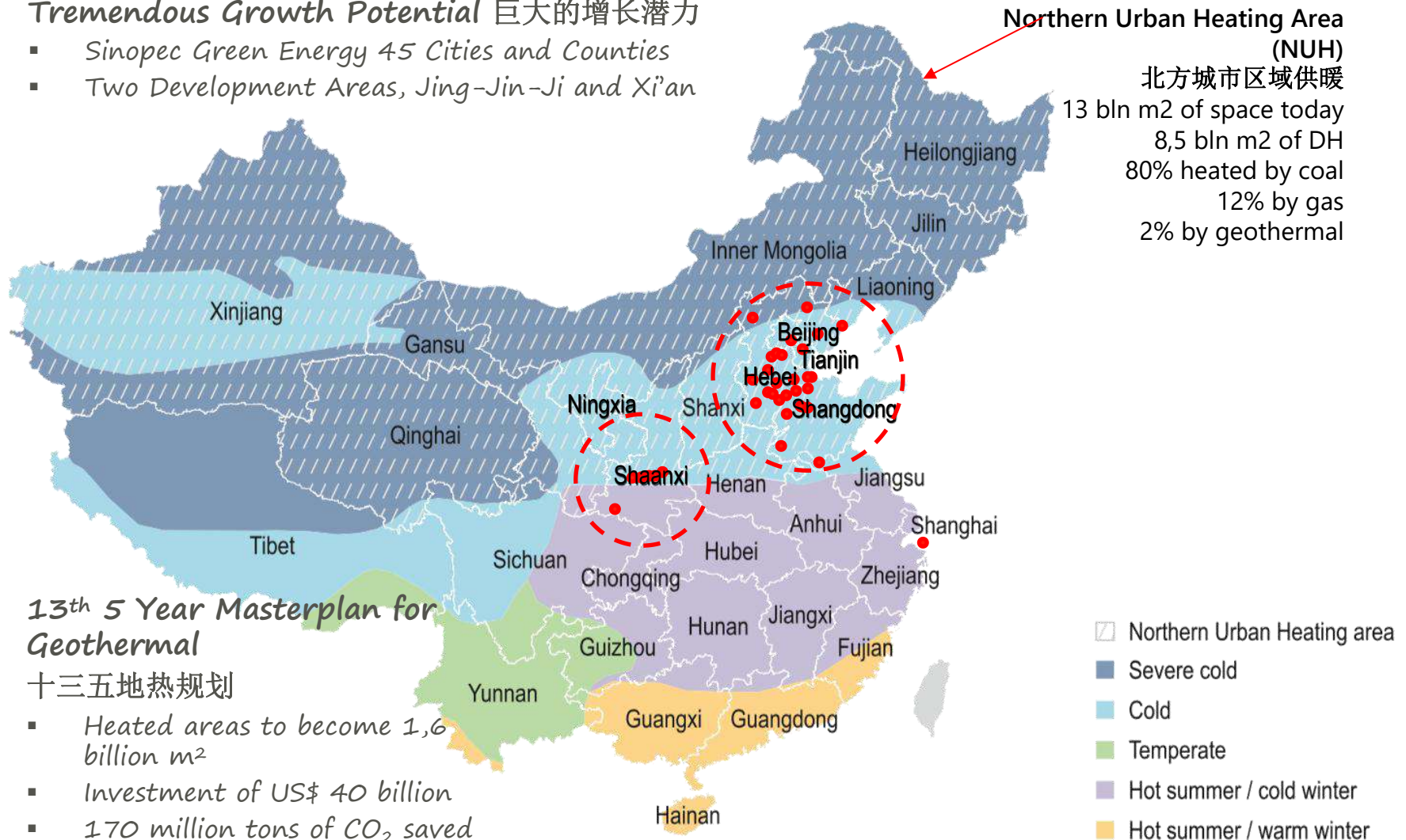
7,500,000 tons

# The Potential in China

## 在中国的潜力

### Tremendous Growth Potential 巨大的增长潜力

- Sinopec Green Energy 45 Cities and Counties
- Two Development Areas, Jing-Jin-Ji and Xi'an



## *The World has Huge Reserves of Undeveloped Geothermal Potential*

这个世界有大量的地热资源待开发

- *A large part of the world has some geothermal potential*  
世界很大一部分地区有地热开发潜力
- *Geothermal Energy is the only renewable source that is base-load, on 24/7, and therefore, ideal for heating*  
地热能是唯一的基础负荷可再生能源，每周7天，每天24小时连续供应，是清洁供暖的理想选择

## *Scaling Up 扩展*

- *Arctic Green will continue to build SGE with an increased momentum beyond IPO in China*  
冰岛极地绿源将持续建设中石化绿源，不仅局限于上市IPO
- *Planning on replicating the China model and launch similar projects in the Belt and Road countries and around the world*  
计划复制中国模式，并在“一带一路”沿线国家和世界各地开展类似项目
- *District cooling in tropical countries such as SE-Asia*  
东南亚热带国家的区域制冷项目



# Expanding along Belt & Road

## 沿着一带一路前进

### Arctic Green Along Belt & Road 一带一路中的极地绿源



Many of the countries along Belt & Road have low temperature geothermal resources

“一带一路”沿线的许多国家拥有低温地热资源

The Icelandic Cooperation in Geothermal will expand to Belt & Road

冰岛地热合作将扩展到一带一路

### Belt & Road and Geothermal

#### 一带一路上的地热

A growing number of countries along Belt & Road are inviting Arctic Green to repeat its success in China

“一带一路”沿线越来越多的国家邀请极地绿源去复制中国模式

# Signing of a Milestone Agreement with ADB

## 与亚洲发展银行签署里程碑协议



# Signing of a Milestone Agreement with ADB 与亚洲发展银行签署里程碑协议





# Thank You ! 谢谢!



## The Problem 挑战

- *Massive Pollution, Environmental Damage, Deteriorating Public Health.*

大范围污染问题，环境破坏，日益严重的公共健康问题



## The Solution 解决方案

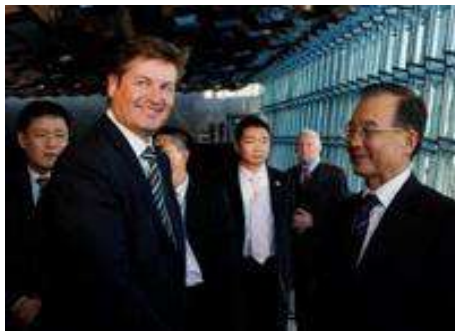
- *District Heating & Cooling of Cities using Geothermal with Co-Generation from other Renewables.*

利用地热及其他可再生能源进行区域供热与制冷

## Zero Emission Cities with

## Zero Subsidies

## 零补贴的清洁城市



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