

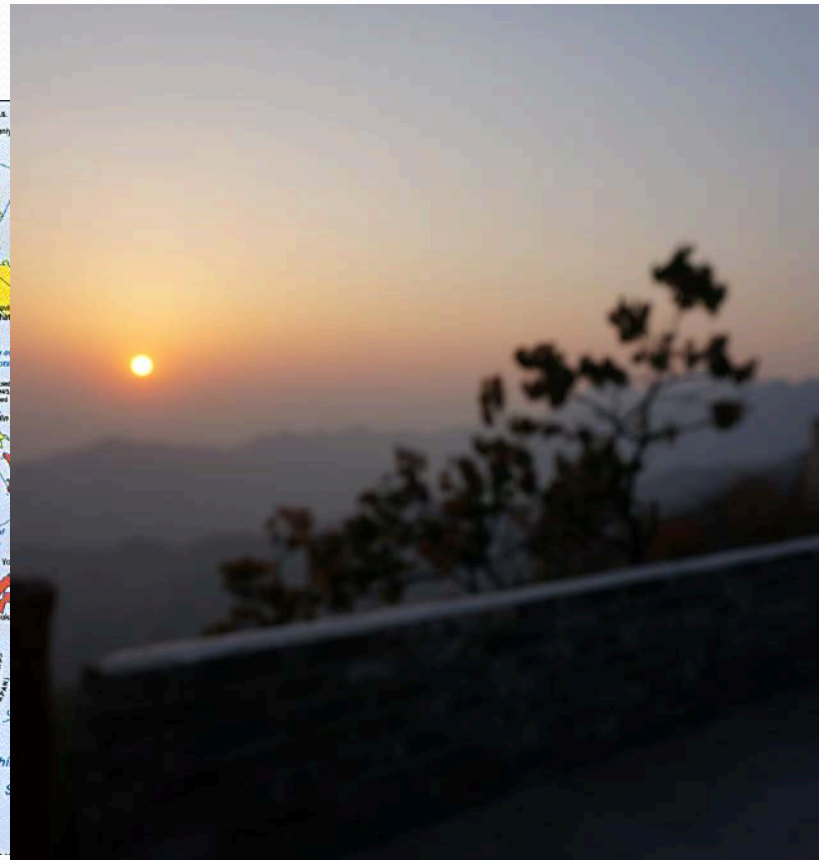
Setting the Scene

- Some Perspectives on Research Cooperation

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China in brief

The geopolitical change of power

Competitive economy - Worlds second largest

- ✓ Economy
- ✓ Investor in R&D and education

Social changes

- ✓ Is full of self confidence
- ✓ Playing an increasing role in international organizations
- ✓ Have opened up - OG in Beijing 2008, EXPO 2010 in Shanghai
- ✓ Have brought 500 mill people out of poverty
- ✓ Becoming well educated
- ✓ Word 's greatest home market – Low cost of unskilled labour
- ✓ Largest exporter of electronics
- ✓ From importer to exporter of renewable energy technologies in five years

Question marks

- ✓ Increasing economic differences
- ✓ Increasing environmental problems
- ✓ Increasing shortage in energy
- ✓ Increasing demands related to human rights and handling of law
- ✓ Increasing focus on corruption
- ✓ Not fulfilled expectations within science and innovation related to the investment in R&D
- ✓ No real High Tech brands– yet - Huawei, ZTE Corporation
- ✓ No Nobel Prices in Natural Sciences or Medicine

China's 12th Five-Year Plan(2011-2015)

- A stable, harmonious society, a more sustainable development, a more equal distribution of wealth
- The Chinese Dream



Economic targets

- GDP to grow by 7% annually on average
- More than 45 million jobs to be created in urban areas

Innovation

- Expenditure on R&D to account for 2.2% of GDP
- 3.3 patents for every 10,000 people

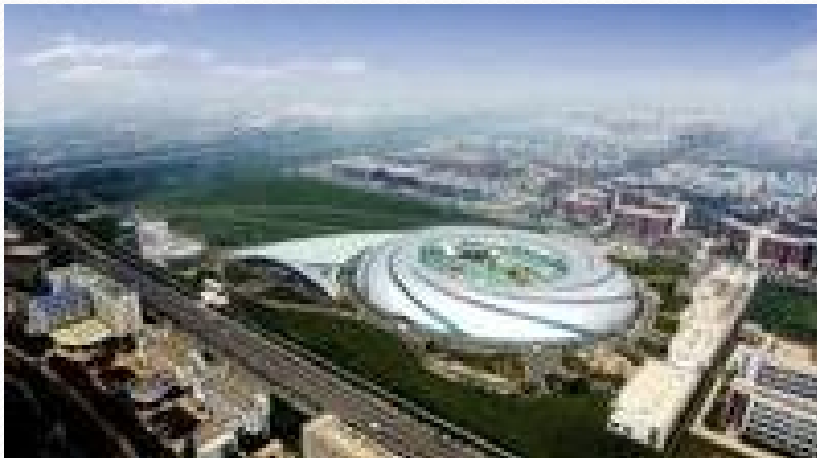
Agriculture

- Annual grain production capacity to be no less than 540 million tones

Environment and clean energy

- Air pollution
- Nuclear energy safety, grid capacity, low carbon

China's 12th Five-Year Plan(2011-2015)

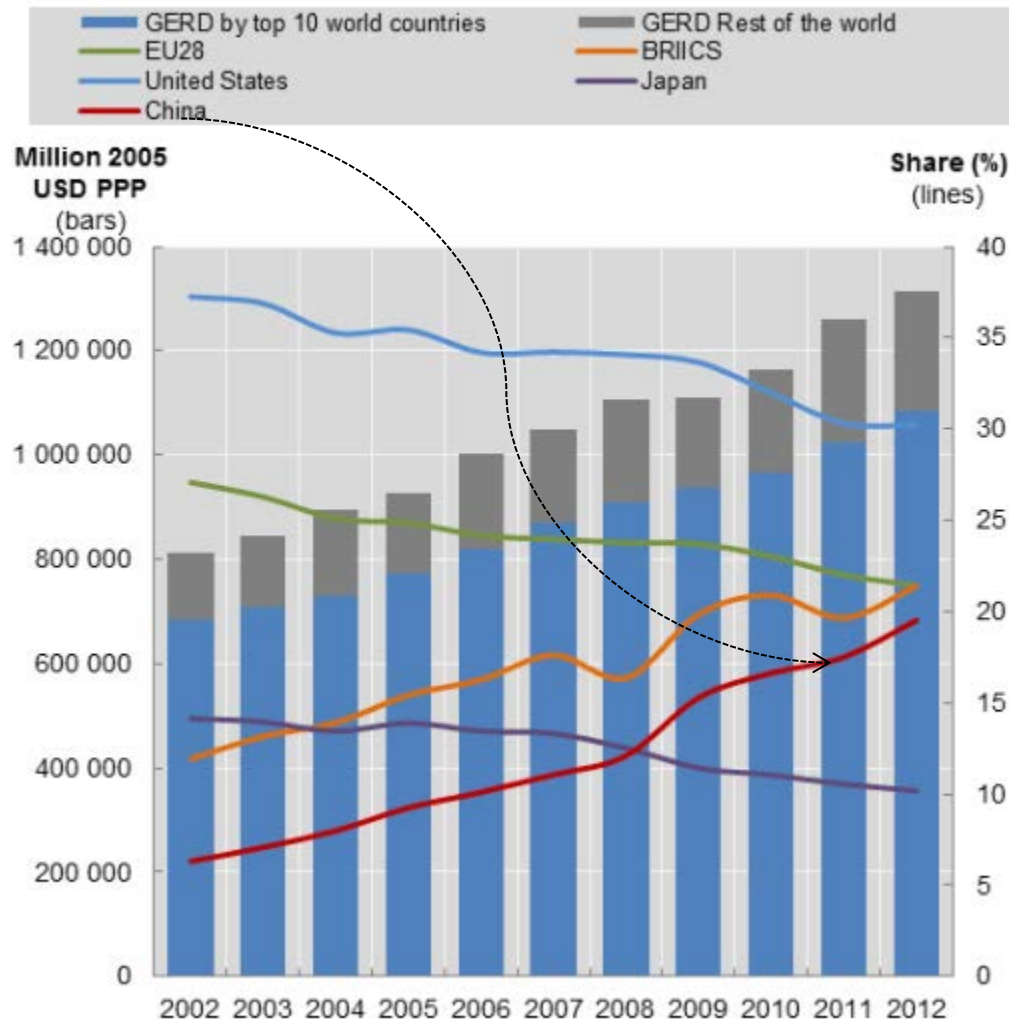


Research and higher education

- The State Guidelines for Medium and Long-term Education Reform and Development Plan 2010-2020

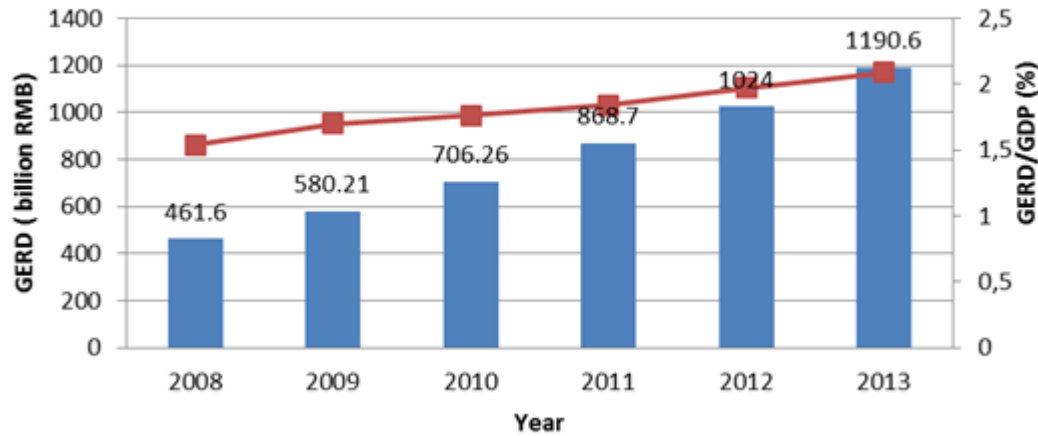
- Increased Quality
- Increased student enrolment
- Indigenous innovation
 - nationwide priority system integrating science, technology and education
- Improved division of labor and regional specialties
- International cooperation
 - academics to return home
 - international organizations to establish their collaborative innovation platforms in China

Share of top players in world R&D spending

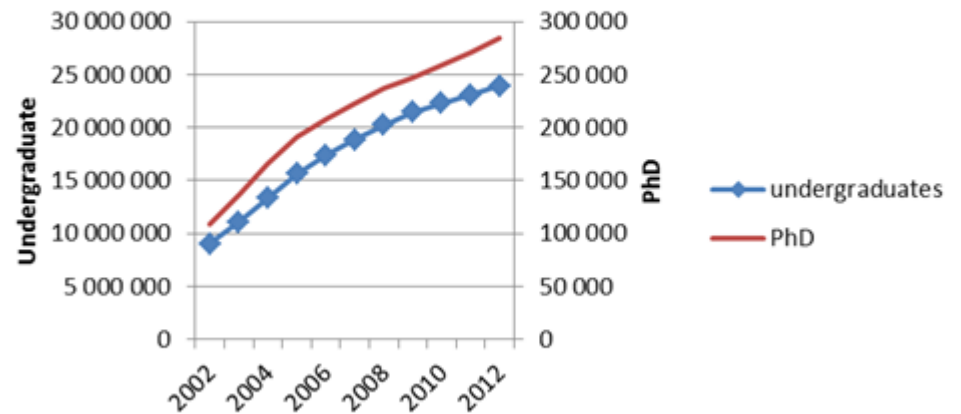


Sources: OECD Main Science and Technology Indicators Database, Eurostat and UNESCO Institute of Statistics, June 2014

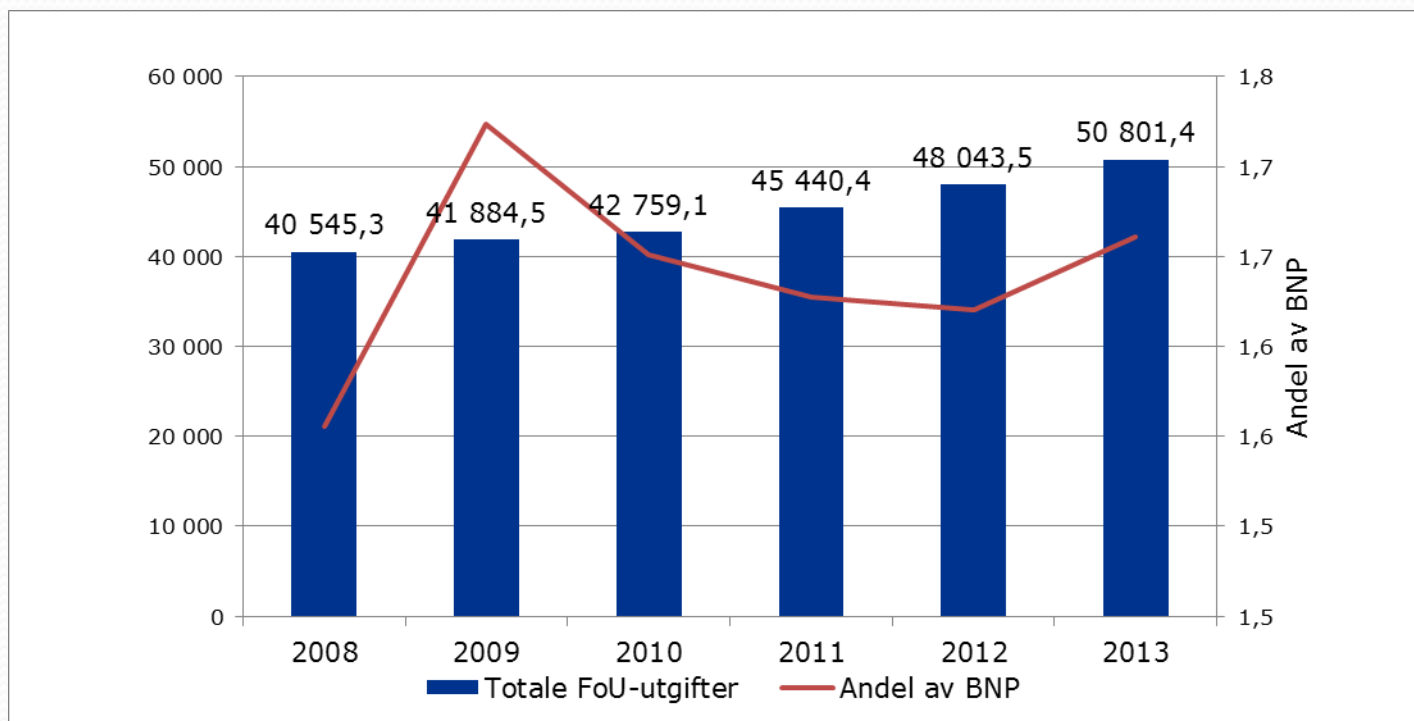
National Expenditure on R&D



Enrolment of undergraduate and PhD students(2002-2012)



National expenditure on research in Norway



RCN- A roadmap for cooperation with China



GOALS for international research collaboration

- help to meet **global challenges**
- help to **increase the quality and capacity** of Norwegian research
- ensure Norway access to **international information production**
- strengthen industry's **competitive ability**
- promote Norway as a **leading research and innovation nation in selected areas**

Norwegian activities to support exchange and research cooperation with China

• Agreements:

- AoC signed with MOST 2008
- MoU signed with MOE in 2008
 - Cultural agreement (China Scholarship Council)
 - 10 students/young scientists both ways (1959)
- MoU - Exchange programme (NSFC) in 1994
 - Exchange of scientists, Project-cooperation, seminars

Sino-Norwegian co-operation programmes

RCN; All programs

RCN; CHINOR

Priorities:

- Climate Change
- Climate technology
- Environment
- Welfare
- ✓ *RCN will through thematic research programmes seek cooperation with Chinese partners based on joint funding of research projects*
- Total budget 2008-2017: 200 mill NOK (UD)

RCN; INTPART

- International partnership for excellence in education and research
- Linking institutional based cooperation
- Yearly budgets 70 mill kr
- In cooperation with SiU

RCN; Scholarships

- 10 Government Scholarships - up to 11 months
- Exchange of Experts - travel support
- Total yearly budget up to 5 mill NOK

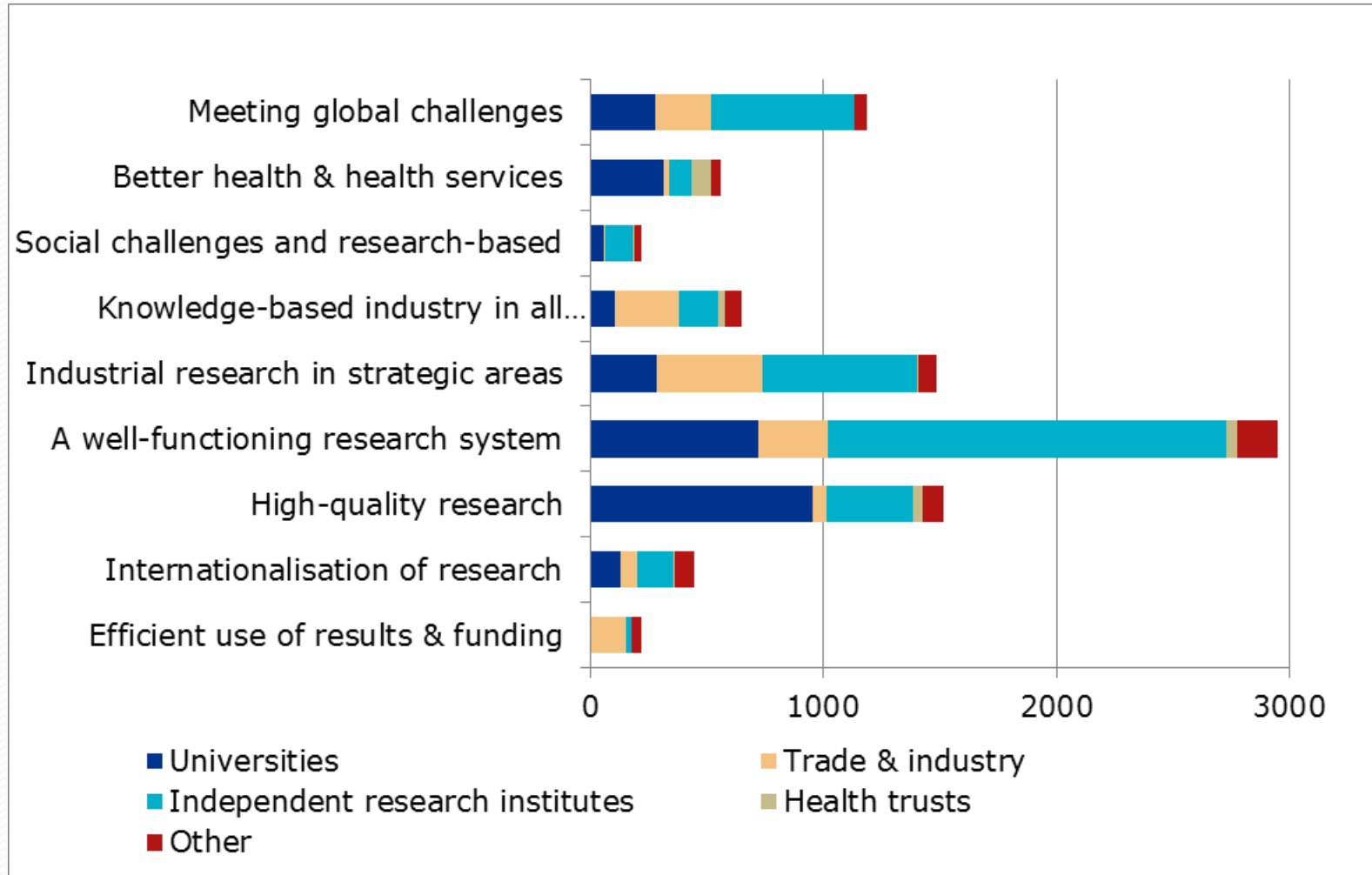
SiU – linking education and research

- (Reinforcement projects - 2 mill NOK)
- UTFORSK - (BRICS) - 8 mill NOK, 3 years pilot
- (High North - 26 mill NOK, 5 years - China not included?!)

Research Council of Norway

Allocations 2015 to the policy objectives set out in the LTP (2015-2025) (mill NOK)

- GERD to reach



Similar priorities

Medium term thematic S&T priorities in China and Norway

中挪国家中期科技发展重点领域

Norway 挪威

- Energy 能源
- Oceans 海洋
- Environment 环境
- Food 食物
- Health 健康
- Welfare 社会福利保障

China 中国 *

1. Energy 能源
2. Water and mineral resources 水和矿产资源
3. Environment 环境
4. Agriculture 农业
5. Manufacturing 制造业
6. Transportation 交通运输业
7. Information industry and modern service industry 信息产业及现代服务业
8. Population and health 人口与健康
9. Urbanization and city development 城镇化与城市发展
10. Public security 公共安全
11. National defense 国防

Both Countries

Frontier Technology

挪威国家研究重点技术

- ICT 信息通讯技术
- New materials/Nanotech 新材料
料纳米技术
- Biotechnology 生物技术

*Chinese National Medium and Long-term
S&T Development Plan Outline(2006-2020)
中国国家中长期科技发展规划纲要

Examples of Norwegian actors in China

- Create good frameworks and stimulate cooperation on many levels:
 - Individually
 - Mobility
 - Programs
 - Institutions
 - Bilateral agreements
 - International cooperation – Europe, Norden
 -

Nasjonalt forskningscenter innen komplementær og alternativ medisin
NRCSTO

Fafo

挪威国家补充替代医学研究

项目签约仪式
Agreement Signing Ceremony

Invitation to the opening of the
Sino-Norwegian Centre for Interdisciplinary Environmental Research

NIVA
Norwegian Institute for Water Research

NTNU
京城胡同留真

SINCIERE

DNV

høgskolen i oslo

Norway-Hubei Week

JOTUN

SKAUGEN MARINE CONSTRUCTION
斯考根 (上海) 船舶技术咨询有限公司

NZC
Nansen-Zhu International Research Centre, Beijing
<http://nzc.iap.ac.cn>

NBA
Norwegian Business Association

Activities (1)

Strategic partnerships – Joint Research Centers

- Nansen - Zhu/ Nansensenteret/UiB – CAS; climate models
- SINCIERE/UiO and others – CAS; environment/ecology
- NTNU – Tsinghua Univ; materials/clean energy
- NTNU – Shanghai Jiao Tong University; sustainable energy
- NTNU – Renmin and China Post and Tele University, ICT
- Sintef – Zhejiang University; CCS
- Bioforsk – HAAS; agriculture (soil, potato, rice)
- Fafo – Casted; policies
- *NIBR – CIRD; policies urbanization*
- UiB – China Petroleum University; petroleum/geology
- *UiB – Fudan University/CASS; welfare (Nordic)*
- UIB – BFSU; language/culture – in work
- **HiOA/UiO/Sunnås – several Chinese institutions; Health**
- UiO - Peking University and BFSU; language
- Studylink; HiTel, UiAgder, HiGjøvik- Wuhan; environment, ICT

HAAS-Bioforsk low carbon centre:



HAAS-Bioforsk JRC



Fruit and berries and other areas

Potato research

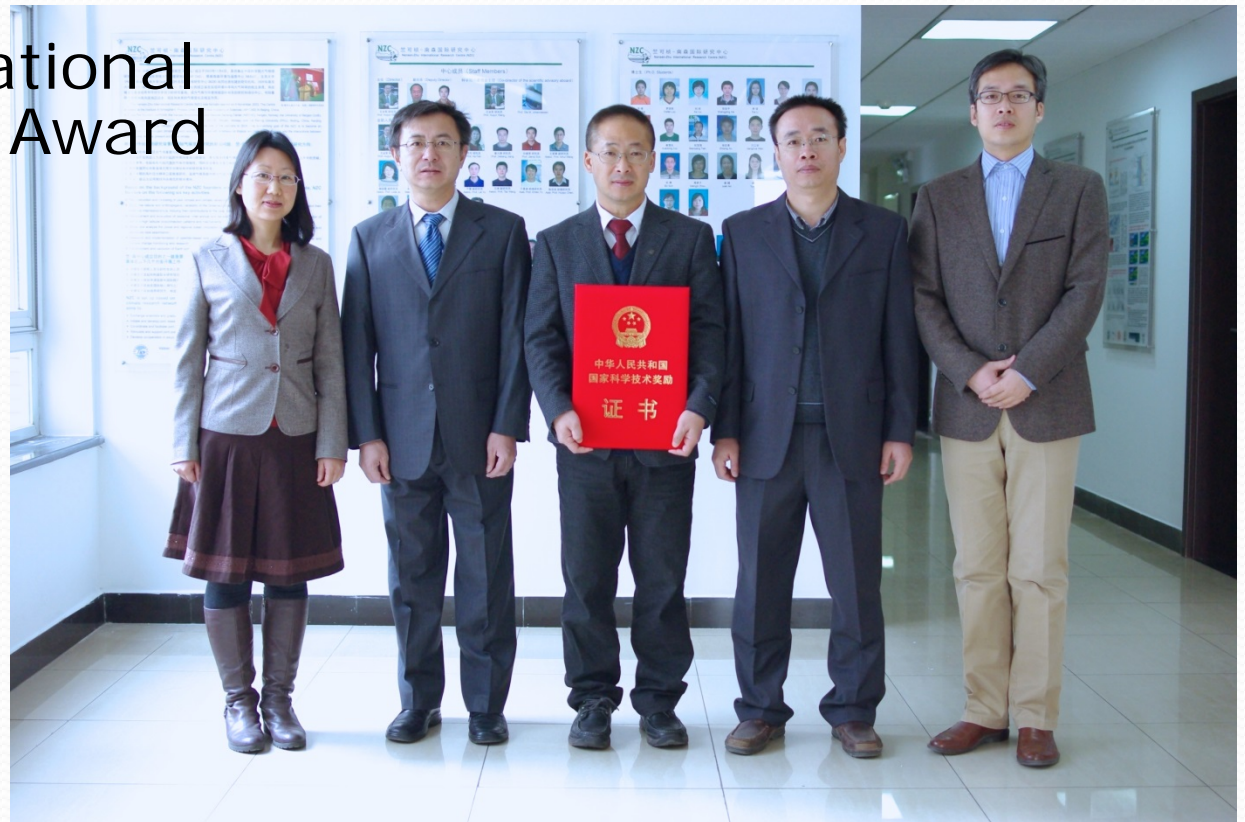
Pesticide analyses and food safety

Soil, environment and cultivation



Nansen-Zhu International Research Centre

NZC Won the National
Natural Science Award
(second class)





SINCIERE arranges a conference on Sino-Norwegian interdisciplinary environmental and climate research

- New knowledge. New insight. Better local, regional and global management -

Venue in Beijing March 25-27, 2015

The conference is arranged jointly with NZC/CAS, RCEES/CAS, CHINOR/RCN and N. Embassy

The goal of this conference is to

- Visualize the quality, relevance and strength of the bilateral cooperation within environmental and climate research
- Presenting major Sino-Norwegian projects during the past 25 years, including 15 CHINOR projects
- Visualize how these activities have led to renewed and strengthened policies in the two countries and further strengthened the cooperation between China and Norway
- To deliver a conference report, initiate contacts and follow-up meetings to various relevant directorates and authorities

The scientific program

- Climate modeling, effects and remote sensing
- Sources of Greenhouse gasses
- Environmental issues

CANCELLED

Global Challenges

Science is challenged

– the climate, energy and economic crisis affects all nations and challenges all academic disciplines

Climate change
- CO2 emission



Economic growth
– unsustainable
energy demand

Poverty reduction
- Food security

China's largest challenges

Scarcity of resources

- Continued growth demands resources
- Lack of arable land, fresh water and forest
 - Half the amount of arable land per capital compared to the world average, one fourth the water, one tenth the forests.
- But has the world's largest coal reserves

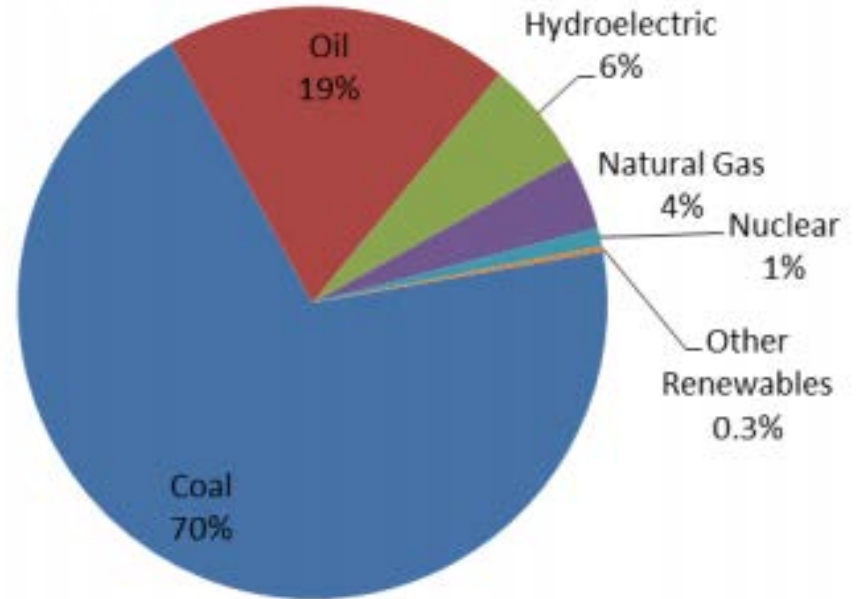
Pollution

- SO₂- and CO₂-emissions – China is the largest source in the world
- Deaths from respiratory illnesses 11 times higher than Europe and the US.

Consumption

- China's power capacity will double by 2030.

China's energy mix



**Present
economic
growth is
unsustainable**

China's 12th Five-Year Plan(2011-2015)



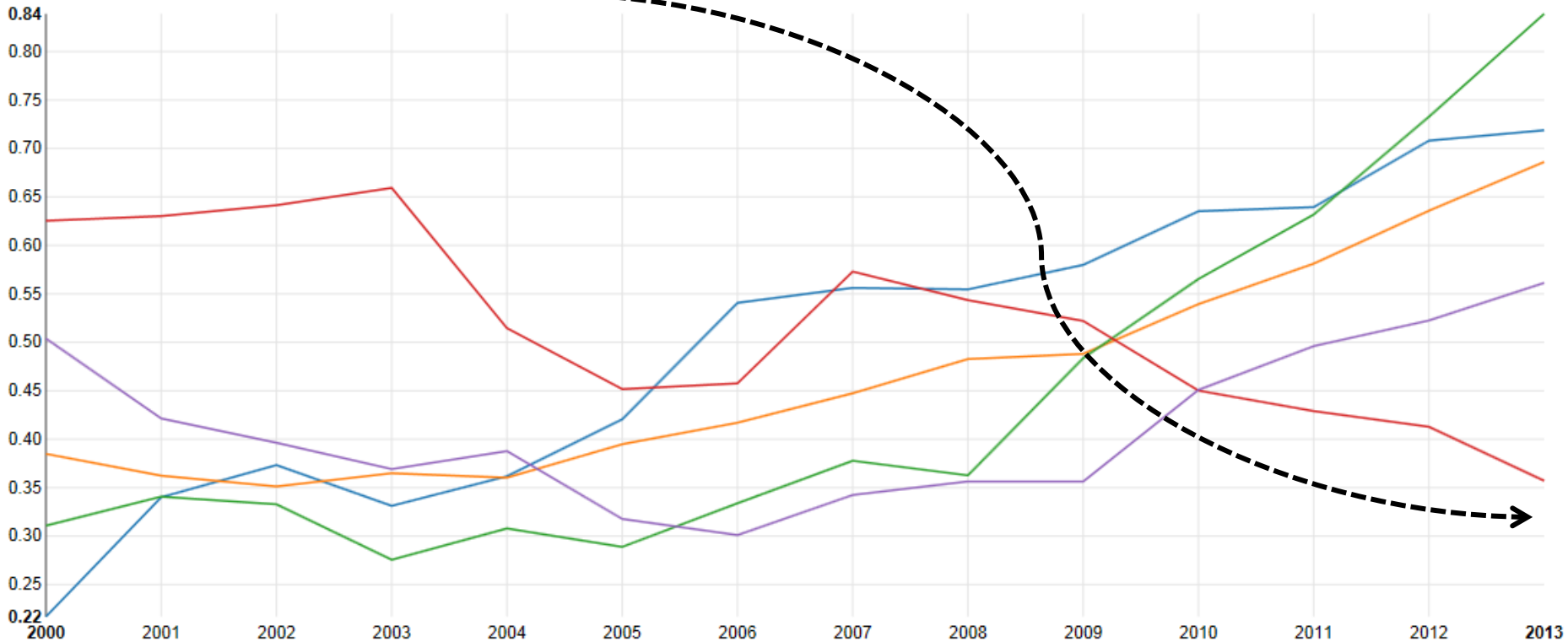
China's clean energy plan (2011-2015)

- Nuclear energy projects with a combined generation capacity of 40 million kw – temporarily halted of safety concerns in 2013
- Hydropower stations with an installed capacity of 120 million kw.
- Six large wind power bases on land and two in coastal areas to create at least 70 million kw of wind power.
- At least 5 million kw of solar power created.
- Construction of oil and gas pipelines of about 150,000 km including one to central Asia and one to Kazakhstan and Myanmar.

Well-Being Index Trends in Underlying Indicators

Re-scale Normalization

Governance
 Social
 Innovation
 Environmental
 Economic
 All
 None



CONTROL ACTION PLAN

- 10 billion RMB to fight air pollution

国务院关于印发大气污染防治行动计划的通知

国发[2013]37号

各省、自治区、直辖市人民政府，国务院各部委、各直属机构：

现将《大气污染防治行动计划》印发给你们，请认真贯彻执行。

国务院

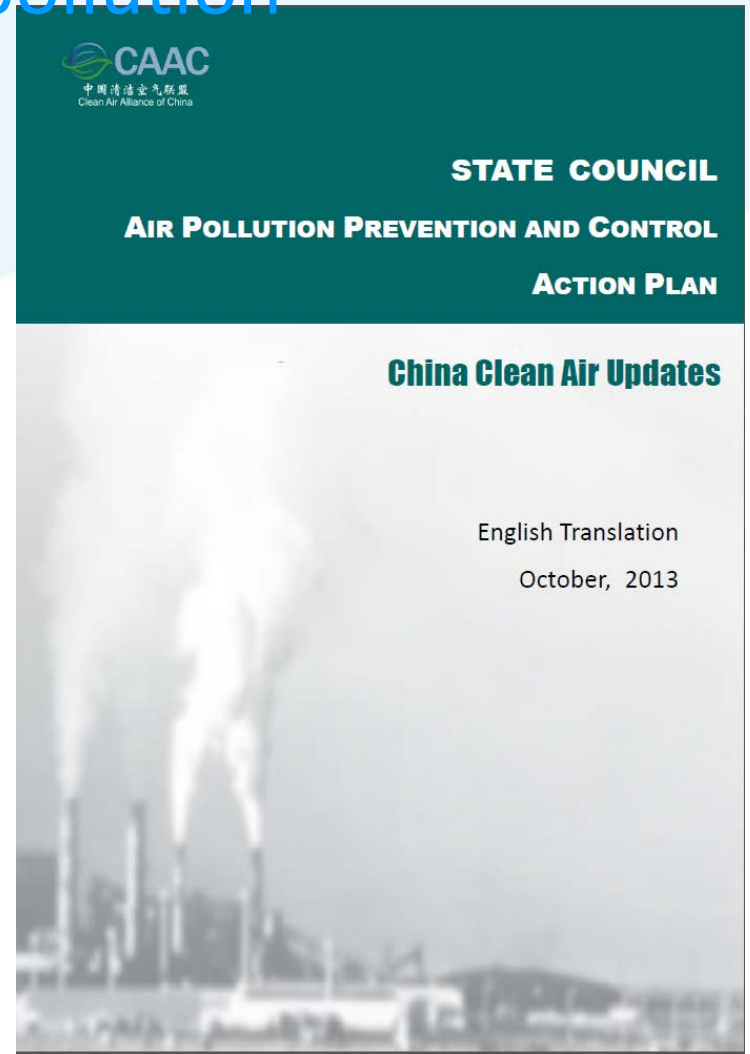
2013年9月10日

(此件公开发布)

大气污染防治行动计划

Specific indicators By 2017

- Urban PM₁₀ shall decrease by 10% compared with 2012;
- PM_{2.5} in Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta region shall respectively fall by around 25%, 20% and 15%.
- Fine particulate matter annual concentration in Beijing shall be controlled below 60 ug/m³.

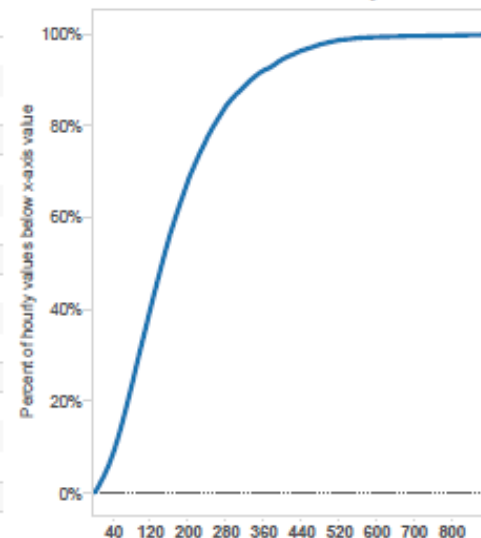


Summary: Beijing PM2.5 pollution 2008 - 2014

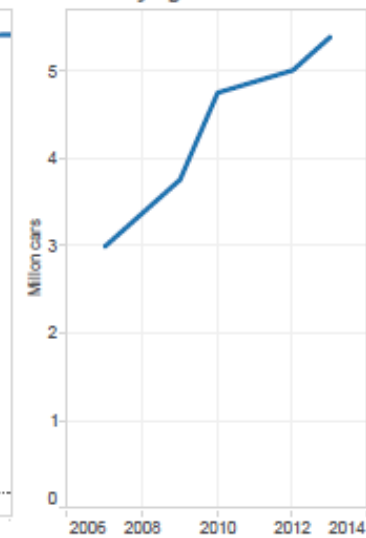
Average Daily concentration

		2008	2009	2010	2011	2012	2013	2014
Q1	January			90.4	44.9	118.9	193.4	118.8
	February		65.4	97.2	150.3	84.4	123.6	174.6
	March		80.6	94.0	58.0	96.5	123.4	110.5
	Total		73.0	93.9	84.4	99.9	146.8	134.6
Q2	April	103.9	87.1	80.1	91.7	87.8	65.8	95.1
	May	98.4	84.0	87.1	65.1	91.0	85.2	72.2
	June	99.8	96.8	109.0	108.8	96.6	111.5	59.0
Total	100.7	89.3	92.1	88.5	91.8	87.5	75.5	
Q3	July	89.7	105.8	123.4	107.4	80.6	68.8	89.6
	August	65.4	107.4	97.7	103.7	81.2	61.9	
	September	59.3	108.7	122.8	95.0	60.0	90.9	
Total	71.5	107.3	114.6	102.0	73.9	73.9	89.6	
Q4	October	84.2	92.8	118.8	145.6	95.0	106.6	
	November	73.1	155.1	138.4	109.4	87.4	90.7	
	December		109.0	97.1	108.7	109.2	98.5	
Total	78.7	119.0	118.1	121.2	97.2	98.6		
Grand Total		84.2	99.3	104.7	99.0	90.7	101.7	102.8

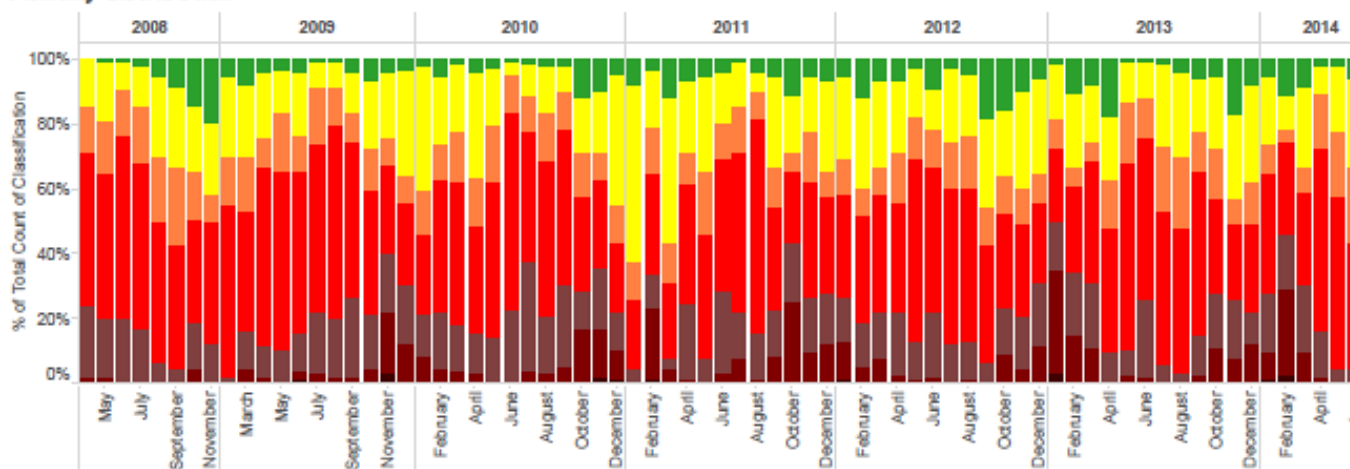
Cumulative distribution of hourly values



Cars in Beijing 2007-2013



Monthly distribution



Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.

Data provided by the US State Department from recordings of the American Embassy in Beijing, located in Chaoyang district. Data have not been validated or verified, but are believed to represent a relatively accurate picture of the concentration of Particulate Matter with a size of less than 2.5 micrometer. Measures are in concentration of PM2.5 in micrograms per cubic meter. The classification in relation to health is one that is proportional to concentration of PM2.5 within each class, but class boundaries are unevenly spaced.

What happens in Beijing ?

A lot is done; particularly since OG 2008 Beijing's metro 2002-2009

- Many laws, weak implementation
- Municipality has the responsibility



Why isn't the situation better?

- The problem is complicated



What happens in Beijing ?

A lot is done; particularly since OG 2008 Beijing's metro 2002-2009

- Many laws, weak implementation
- Municipality has the responsibility
- No industry with the air emissions within the 5. ring road
 - but fierce growth throughout northern China
- Solar energy and solar heat
- Large investments in the Metro system
- Within 5. Ring road
 - No person-cars older than 7 years
 - All cars have one day a week they cannot enter the center
 - From 2014, vehicles not registered in Beijing cannot run in Beijing
- Particulate material smaller than 2.5 is measured regularly, and it will be sent out notification



- Beijing will see 50% by 2017, such improvements by the introduction of CO2 quotas (not available/realistic!)
- almost a political scandal with the United States in 2010,
- APAC-Blue-clean air in Beijing possible but costly

Why isn't the situation better?

- The problem is complicated
- The growth greater than the improvements
- Changed winds - melting of the pole ice
 - the wind is West-North-bring with them pollutants from all over northern China, stopping in the mountains to the North
- Private/small discharge
 - 40% from private heating- litter and garbage
 - Diesel buses. Urbanization



China; Water-pollution



- A drinking water reservoir

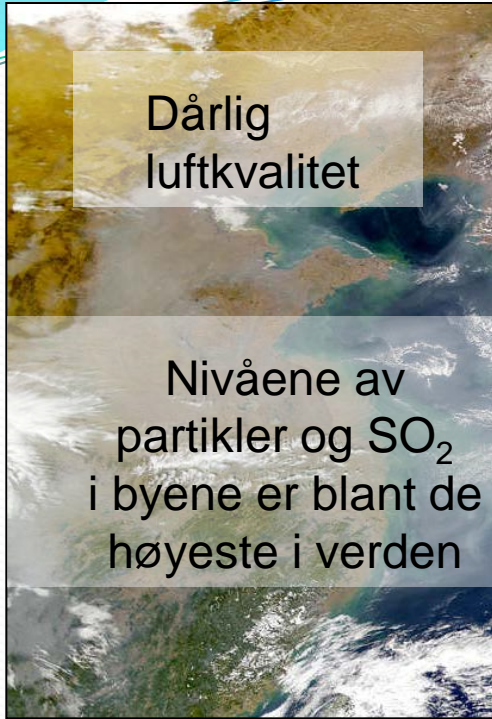
- Heavy rain washes out the dungs

- A Phosphate issue

- Lack of alternatives



China has a large specter of local and regional environmental challenges



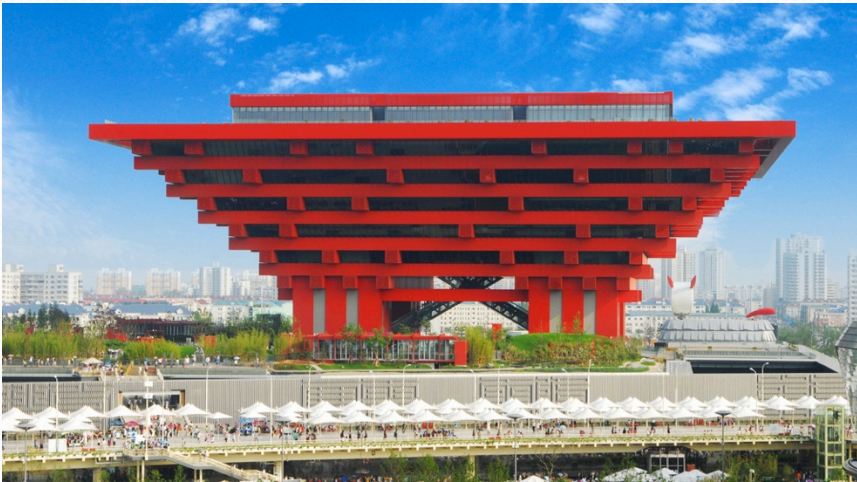
China – why?

China becomes a strong global player

- Norway's 5th largest trading partner
- **The research landscape is changing – strong scientific centers in China**
 - Energy – CCS, Solar, Wind, Modern Coal-fired power-plants, Higher efficiency
 - ICT
 - Materials/Nanotechnology
 - Biotechnology/Life-science
 - Environment – polar research

Norway's interests

- Norwegian research - a lot to give and a lot to gain
 - Based on international quality and uniqueness – international competition
 - Social science, Multi/trans-disciplinary, close cooperation research and authorities/governance
 - IPR, Research ethics, Code of conduct
- Environmental concern
 - from a global perspective
 - European companies will be actors
 - Be part of the developing R&D landscape
- Team Norway?
- Science Diplomacy



SINCIERE – New Strategy

- To build on RCEES and UiO as founding partners
 - Partnership extended to others in each of their national network
- To identify common scientific thematic platforms
 - Based on today's expertise to be enhanced/renewed by multi/trans-disciplinary cooperation
- To identify common activities – in a short and longer perspective
 - International workshops
 - Student courses (PhD level)
 - Co-advisor for PhD
 - Exchange of PhD and experts
 - Sharing of data, common research facilities
 - Joint research projects
 - An active communication strategy and webpage



➤ SINCIERE - A New Strategy



- RCEES and UiO Energy guidelines for future cooperation.

- RCEES and UiO Energy has a great interest in strengthening the cooperation between the two countries based on the SINCIERE-platform enlarged into multi-disciplinary research within energy, environment and society.
- Critical issues for further cooperation are the prioritized research fields as well as human and financial resources. Important factors are:
 - Research topics should be of common concerns
 - Activities should be complementary, build on comparative advantages and build on close contact
 - Should include young scientists, e.g. exchange of experts and jointly supervision of PhD students
 - Should avoid duplication of already ongoing activities.
- The mechanisms in establishing cooperation;
 - To make the collaborative objective very clear – leading to joint publication in international journals
 - to make it attractive for the scientists to participate – a merit for their future carrier
- The following important elements must be present;
 - There need to be allocated seed funding providing incentive for cooperation planning
 - There should be a potential for available future project funding (suitable funding calls)
 - We should have the right people to take lead – to co-author papers and participate in field work
 - We should
 - base the work on exchange of experts and jointly supervised PhD students
 - arrange dedicated workshop with ambitions for publications in international journals