Recent development of uranium industry in China

——Demand and Supply

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Importance of nuclear energy

- China’s economy is still the second largest.
- The generation and consumption of electricity will expand undoubtedly.
- nuclear industry is very important from the economic, social development and national energy security sides.
- objective : the consumption of the non-fossil energy accounts for about 15% of primary energy by 2020.

Actions taken after Fukushima accident

- **There hasn't been any radiation death accident, level 2 or higher nuclear power plant accident.**
- **Security level has been set higher to new nuclear power plants.**
- **Important strategic period for China's nuclear development after Fukushima accident.**

- **Continue to see growth in the nuclear industry in China**, nuclear is still needed for increased supply of electricity and adjustment of energy structure;
- **Move more cautiously**

  Began to take the nuclear and radiation safety issues even more seriously;

  Progressed nuclear safety checks on all operating facilities and projects under construction nationwide;

  Related regulations has been improved,《Twelfth Five Plan of Nuclear Safety and Radioactive Pollution Protection and Prospective Goal for 2020》was passed by State Council on June 4th, 2012.

Nuclear Power Development

➢ Government's nuclear power program

The total capacity of nuclear power plants will reach 40GWe by the end of 2020, while the other 18GWe is under construction.

➢ Nuclear Power Development

- 15 nuclear reactors currently in operation, with a capacity of 11.88GWe, accounting for 1.22% of China's total capacity of electricity.
- Additional 26 units, with the capacity of 29.89GWe are under construction.
- Reach 40.94Gwe by 2015.

Sources from http://www.cec.org.cn/

Nuclear Power Plants in Operation

Index	Name of Nuclear Power Plant		Reactor	Capacity MWe	Construction	Operation
1	Qingshan I		PWR	320	1985-3-21	1991-4-1
2	Daya Bay	No. 1	PWR	984	1987-8-7	1994-2-1
		No. 2	PWR	984	1988-4-7	1994-5-6
3	Qingshan II	No. 1	PWR	650	1996-6-2	2002-4-15
			PWR	650	2006-4-28	2010-10-5
		No. 2	PWR	650	1997-4-1	2004-5-3
			PWR	650	2007-1-29	2011-11-25
4	Ling'ao I	No. 1	PWR	990	1997-5-15	2002-5-28
		No. 2	PWR	990	1997-11-28	2003-1-8
	Ling'ao II	No. 3	PWR	1080	2006-6-15	2010-8-7
		No. 4	PWR	1080	2006-6-15	2011
5	Qingshan III	No. 1	HWR	728	1998-6-8	2002-12-31
		No. 2	HWR	728	1998-9-25	2003-7-24
6	Tianwan	No. 1	PWR	1060	1999-10-20	2007-5-17
		No. 2	PWR	1060	2000-9-20	2007-8-16
Total Installed Capacity of 15 Units, MWe				11880		

Nuclear Power Plants under Construction

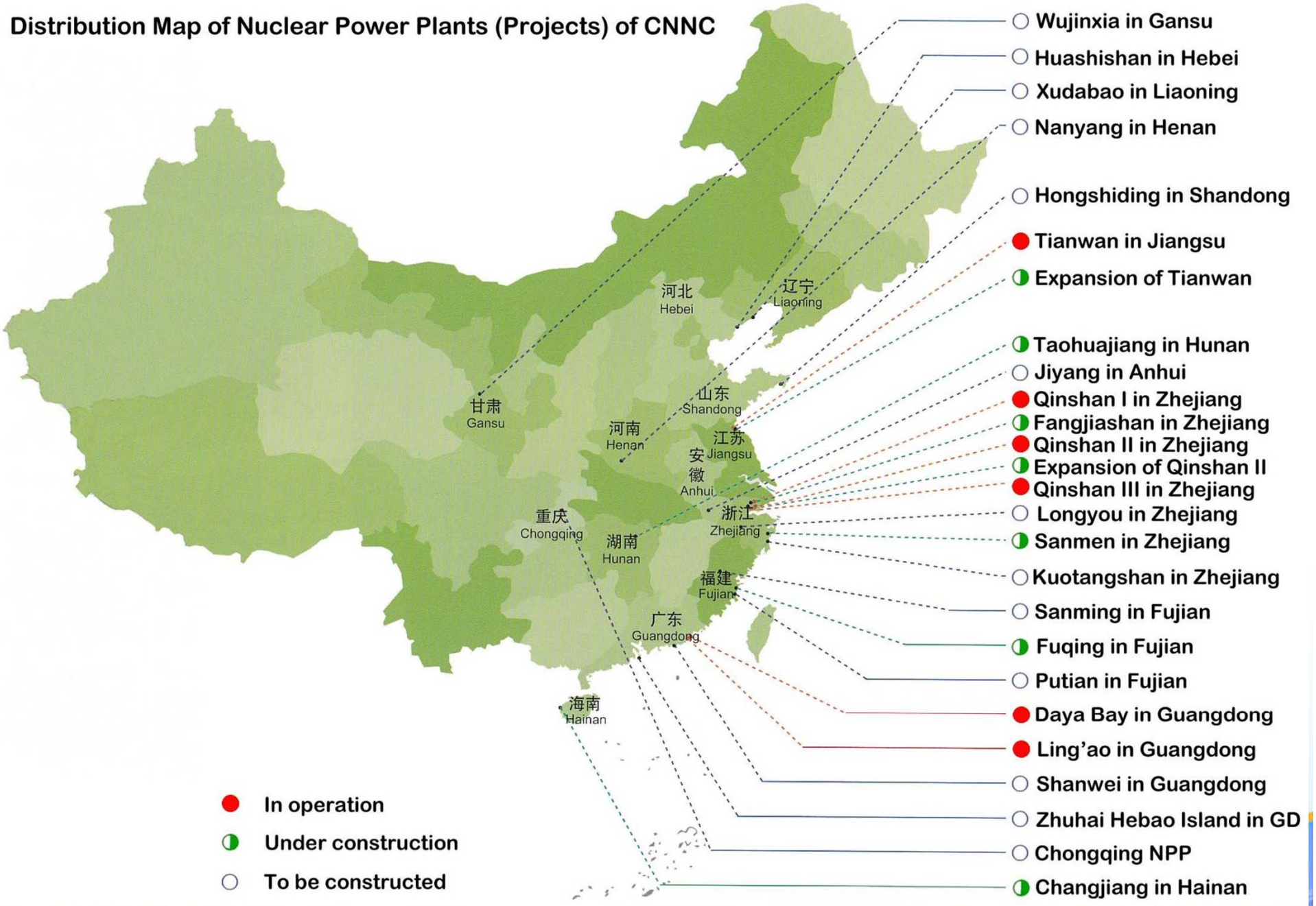
Index	Province	Name of Nuclear Power Plant		Reactor	Construction	Capacity, MWe
1	Liaoning	Hongyianhe	No. 1	CPR PWR	2007-8-18	1080
2	Fujian	Ningde	No. 1	CPR PWR	2008-2-18	1080
3	Liaoning	Hongyianhe	No. 2	CPR PWR	2008-3-28	1080
4	Fujian	Ningde	No. 2	CPR PWR	2008-11-3	1080
5	Fujian	Fuqing	No. 1	PWR II	2008-11-21	1080
6	Guangdong	Yangjiang	No. 1	CPR PWR	2008-12-16	1080
7	Zhejiang	Fangjiashan	No. 1	PWR II	2008-12-26	1080
8	Liaoning	Hongyianhe	No. 3	CPR PWR	2009-3-7	1080
9	Zhejiang	Sanmen	No. 1	AP1000 PWR	2009-4-19	1250
10	Guangdong	Yangjiang	No. 2	CPR PWR	2009-6-5	1080
11	Fujian	Fuqing	No. 2	PWR II	2009-6-17	1080
12	Zhejiang	Fangjiashan	No. 2	PWR II	2009-7-17	1080
13	Liaoning	Hongyianhe	No. 4	CPR PWR	2009-8-15	1080

Nuclear Power Plants under Construction

Index	Province	Name of Nuclear Power Plant		Reactor	Construction	Capacity, MWe
14	Zhejiang	Sanmen	No. 2	AP1000 PWR	2009-12-15	1250
15	Guangdong	Taishan	No. 1	EPR PWR	2009-12-21	1750
16	Shandong	Haiyang	No. 1	AP1000 PWR	2009-12-28	1250
17	Fujian	Ningde	No. 3	CPR PWR	2010-1-8	1080
18	Guangdong	Taishan	No. 2	EPR PWR	2010-4-15	1750
19	Hainan	Changjiang	No. 1	PWR II	2010-4-25	650
20	Shandong	Haiyang	No. 2	AP1000 PWR	2010-6-20	1250
21	Guangxi	Fangchenggang	No. 1	CPR PWR	2010-7-30	1080
22	Fujian	Ningde	No. 4	CPR PWR	2010-9-29	1080
23	Guangdong	Yangjiang	No. 3	CPR PWR	2010-11-15	1080
24	Hainan	Changjiang	No. 2	PWR II	2010-11-21	650
25	Guangxi	Fangchenggang	No. 2	CPR PWR	2010-12-28	1080
26	Fujian	Fuqing	No. 3	PWR II	2010-12-31	1080
Total Units		26		Total Installed Capacity, MWe		30970

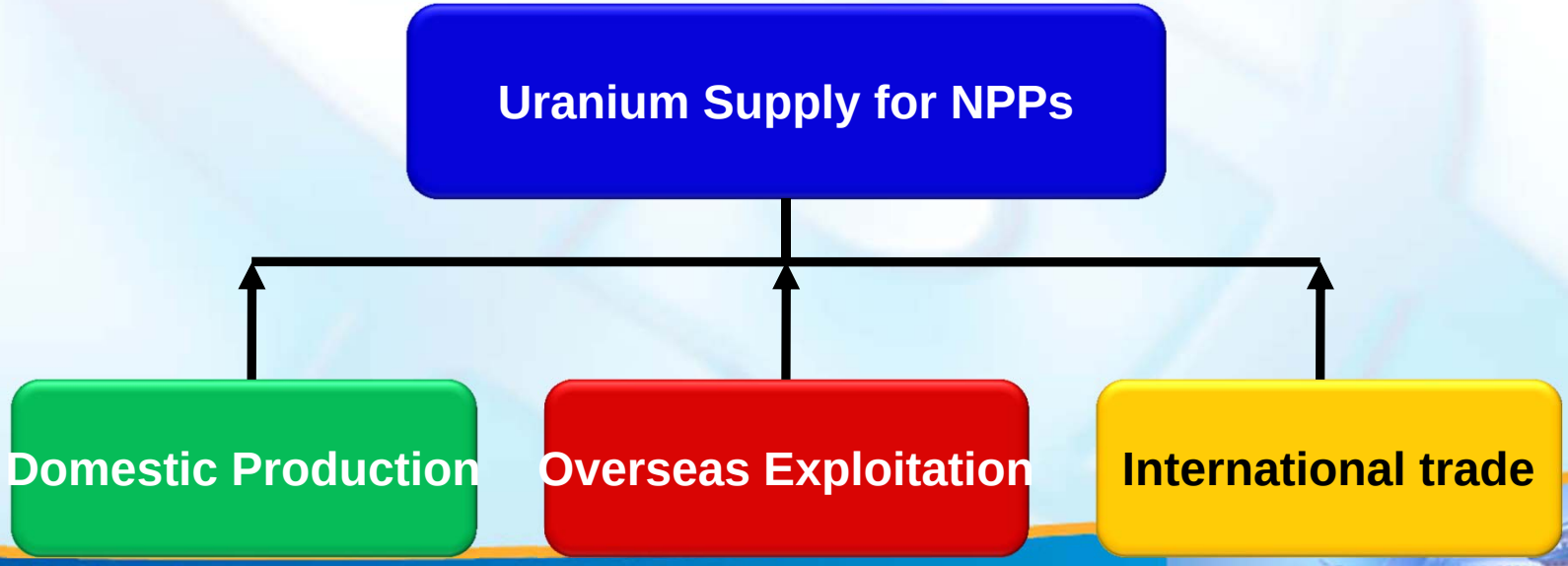
Sources from Mr. Zhang Huazhu's "The achievements and Prospection of China Nuclear Power Development" in Defence Science & Technology Industry (No. 4 in 2011)

Distribution Map of Nuclear Power Plants (Projects) of CNNC

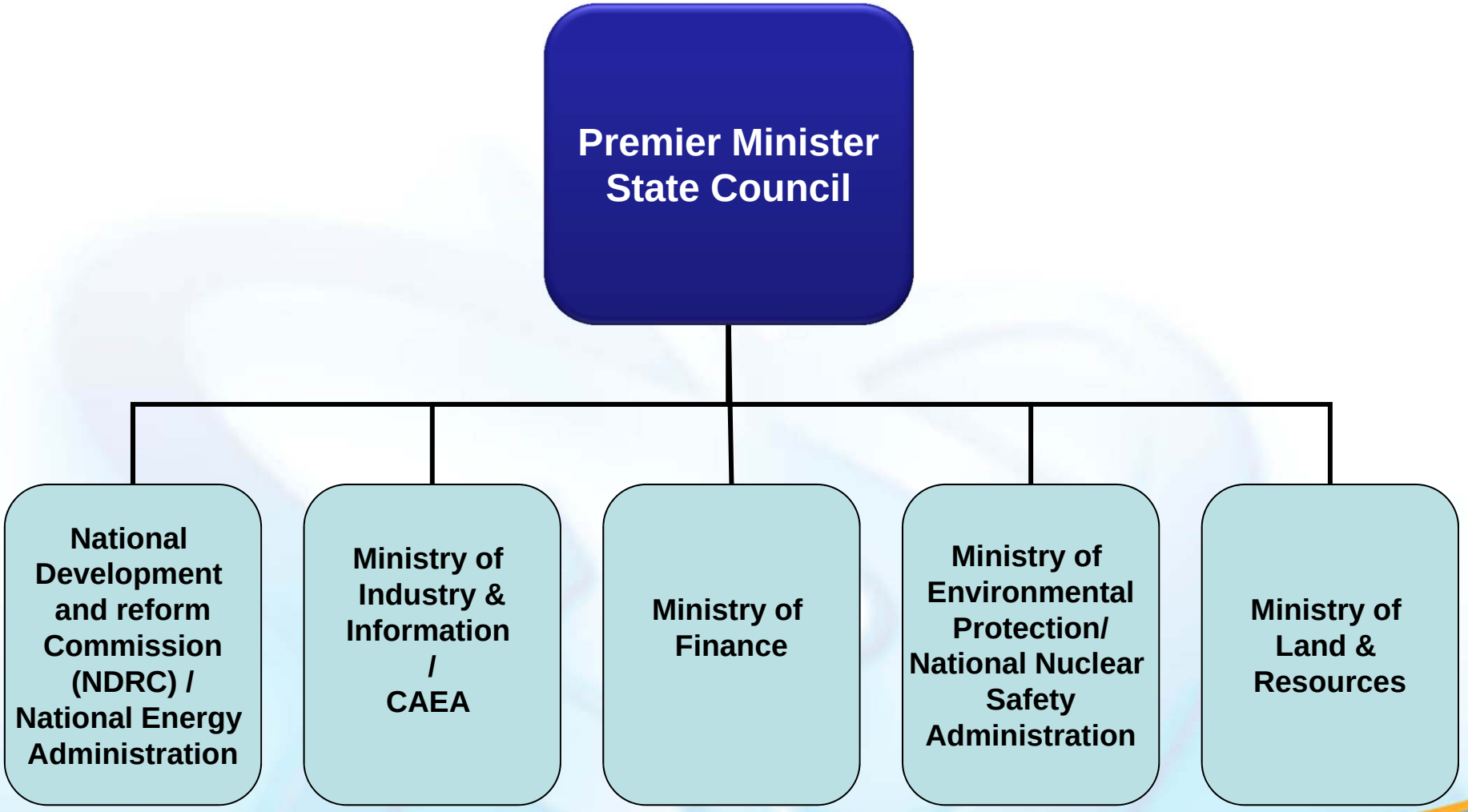


U Demand and Supply

- Significant growth in nuclear capacity and uranium demand is anticipated, demand for uranium is expected to continue to rise for the foreseeable future.
- Based on the preliminary calculation, the uranium requirements will be 8,200tU in 2020.
- “Facing Two Markets and Using of Two kinds of Resources” policy has been taken by Chinese government. Uranium supply will be guaranteed through three main channels, domestic production, overseas exploitation and international trade.



Related Government Agencies



Domestic U Industry

All the domestic uranium production centers are carried out by China National Nuclear Corporation. It's a 100% state owned company which also engages in oversea projects.

100% State Owned Company

China National Nuclear Corporation(CNNC)

Controls all the domestic projects inside China

Dept. of Mining & Geology , CNNC

Wholly owned subsidiaries of CNNC

- **Bureau of Geology (BOG)**
- **China Nuclear Uranium Corporation (CNUC)**
- **China Uranium Corporation Ltd.(CUC)**

Domestic U Resources

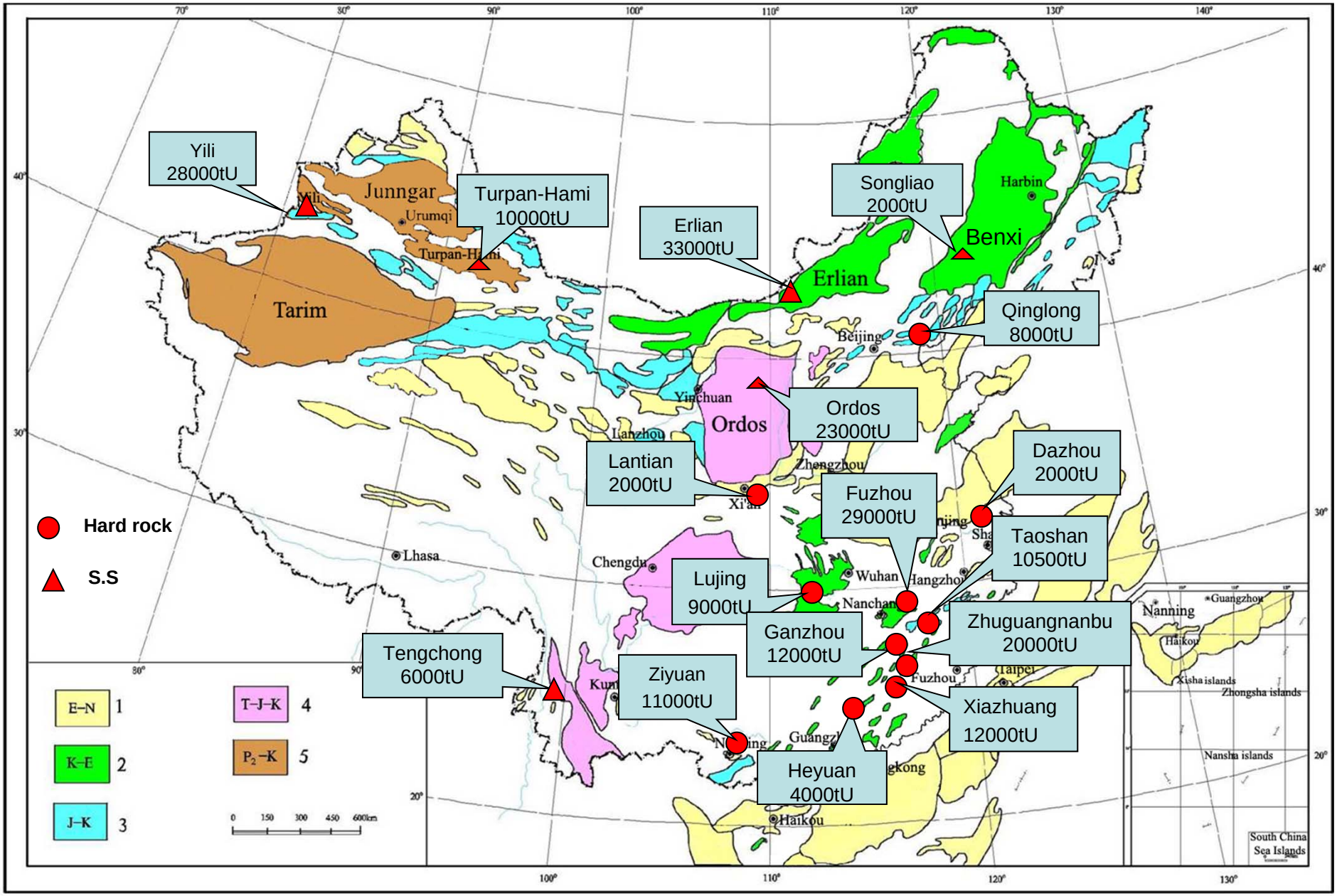
- Over 90% of domestic uranium deposits were discovered by BOG.
- Granite type, volcanic rock type, sandstone type, black shale type- 4 types of uranium deposits account for over 90% of the proved reserves.
- More financial input and actual works, domestic uranium prospecting and exploration has been intensified and increased. 2.6 million meters total drilling footage during 11th five-year plan (2006-2010).
- China has great potential for uranium resources. 1.2 -1.7 million tonnes potential uranium resources are predicted.
- Uranium resource in China totalled 221500tU according to the latest data, as listed in the following table.

Domestic U Resources

NO.	Location(provinces +places/name)		tU
1	Jiangxi	Xiangshan Ganzhou Taoshan	29000 12000 10500
2	Guangdong	Xiazhuang Zhuguangnanbu Heyuan	12000 20000 4000
3	Hunan	Lujing	9000
4	Guangxi	Ziyuan	11000
5	Xinjiang	Yili Turpan-Hami	28000 10000
6	Inner Mongolia.	Erdos Erlian Songliao	23000 33000 2000
7	Hebei	Qinglong	8000
8	Yunnan	Tengchong	6000
9	Shanxi	Lantian	2000
10	Zhejiang	Dazhou	2000
Total			**221500**

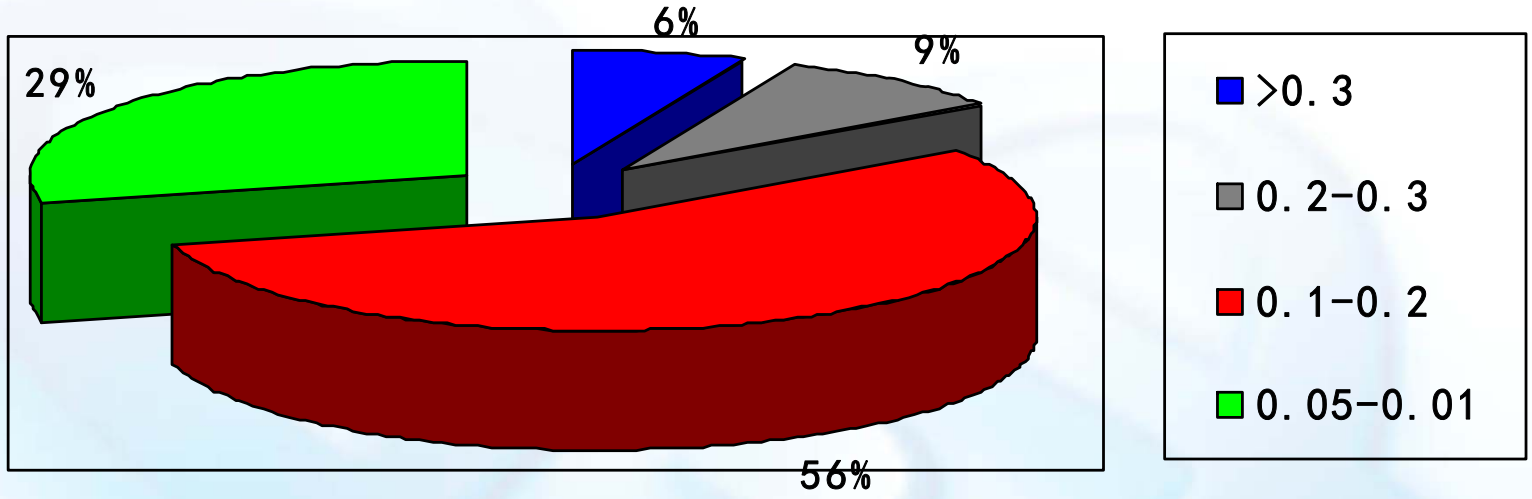
Identified conventional resources 221500tU(RAR+IR) in China

Major U Deposits



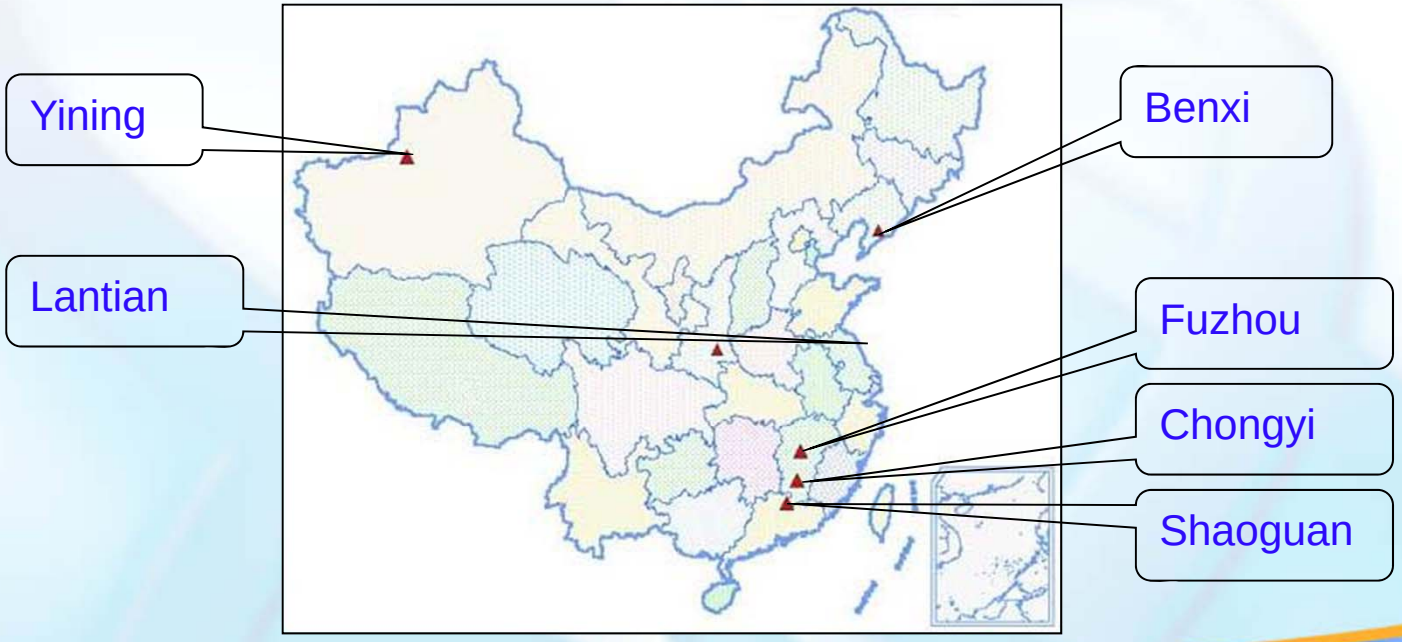
Grade Character

The grade character of uranium resources in China (%)



Domestic U Production

- The domestic uranium mining of the whole country is carried out by CNNC through its subsidiary, China Nuclear Uranium Corporation.
- Six production centres, Fuzhou and Chongyi in Jiangxi of East China, Lantian in Shaanxi of Central China, Benxi in Liaoning of Northeast China, Shaoguan in Guangdong of South China and Yining in Xinjiang of Northwest China.



Location of the uranium production centres

U Production Centers

	Centre #1	Centre #2	Centre #3	Centre #4
Name of production centre	**Fuzhou**	**Chongyi**	**Yining**	**Lantian**
centre classification	**existing committed**	**existing**	**existing**	**existing**
Date of first production (year)	**1966**	**1979**	**1993**	**1993**
Source of ore: ▸Deposit names(s) ▸Deposit type(s) ▸Recoverable resources (tU) ▸Grade (% U)	**Volcanic**	**Granite**	**Deposit 512 Sandstone**	**Lantian Granite**
Mining operation: ▸Type (OP/UG/ISL) ▸Size (tonnes ore/day) ▸Average mining recovery (%)	**UG 700 92**	**UG 400 90**	**ISL NA NA**	**UG 200 80**
Processing plant: ▸Acid/Alkaline ▸Type (IX/SX) ▸Size (tonnes ore/day) For ISL (mega or kilolitre/day or litre/hour, specify) ▸Average process recovery (%)	**Conventional Acid IX 700 90**	**Heap Leach Acid IX 350 84**	**Acid IX NA NA**	**Heap Leach Acid IX NA 90**
Nominal production capacity (tU/year)	**350**	**150**	**330**	**100**
Plans for expansion (Yes/No)	**Yes**	**Yes**	**Yes**	**NA**
Other remarks	**Expansion to 500** tU/a	**Expansion to 300** tU/a	**Expansion To 500** tU/a	

U Production Centers

	Centre #5		Centre #6
Name of production centre	**Benxi**		**Shaoguan**
Production centre classification	**existing**	**existing**	**existing**
Date of first production (year)	**1996**	**2007**	
Source of ore: ›Deposit names(s) ›Deposit type(s) ›Recoverable resources (tU) ›Grade (% U)	**Benxi** **Granite**	**Qinglong** **Volcanic**	**Granite**
Mining operation: ›Type (OP/UG/ISL) ›Size (tonnes ore/day) ›Average mining recovery (%)	**UG** **100** **85**	**UG** **200** **85**	**UG** **500** **90**
Processing plant: ›Acid/Alkaline ›Type (IX/SX) ›Size (tonnes ore/day) For ISL (mega or kilolitre/day or litre/hour, specify) ›Average process recovery (%)	**Acid** **SX** **NA** **90**	**IX** **NA** **96**	**Acid** **SX** **NA** **90**
Nominal production capacity (tU/year)	**120**	**100**	**200**
Plans for expansion (Yes/No)	**NA**	**NA**	**NA**
Other remarks			

U Production Centers

Qinglong uranium Mine

Qinglong uranium mine of Benxi production centre had reached its full capacity since 2009 for building up coverings to keep the heaps warm in the cold Winter of Northeast China.

ISL in Yining, Xinjiang

Fuzhou Mine & Mill

International U Trading

- China is one of the world's largest potential markets of uranium. Only two companies has the authorization of importing uranium, China Nuclear Energy Industry Corporation (CNEIC), subsidiary of CNNC, and CGNPC Nuclear Fuel Co., Ltd, subsidiary of China Guangdong Nuclear Power Corporation(CGNPC).
- CNEIC signed a long term uranium supply contract with Cameco Inc. on June 24, 2010 for total 10 000tU supply in 10 years.
- CNEIC signed a long term uranium supply contract with KAZATOMPROM on February 21, 2011 for total 30 000tU supply from 2011 to 2020.

Sources from http:// www.cneic.com.cn/

Exploration & Exploitation Overseas

- **China's ST & MT needs are well covered by inventories & contracts, LT remains very promising.**
- **Chinese companies began to search opportunities for oversea uranium development, at the beginning of the 21st century.**
  - CNNC has been searching for projects in Africa, Asia, Australia and other areas;
  - CGNPC engages projects in Irkol mine Kazakhstan, Rossing South, Namibia;
  - Sino steel & CGNPC also cooperate on projects in Australia.

Oversea Projects of CNNC

China Uranium Corporation Ltd. (CUC)-Oversea uranium resources development platform for CNNC.

- One operating mine- Societé Des Mines D' Azelik, in Niger;
- Two prospecting projects in Namibia and Zimbabwe;
- One project in Mongolia;
- searching for opportunities in other promising regions.

Azelik Project in Niger

- the first overseas uranium project of China
- Mining License, Nov 2007
- Mine life, 20yrs
- 700 tU/yr
- Opening ceremony of testing production was held on March 17, 2011

Exploration Projects in Africa

project	Namibia	Zimbabwe
General information	Operated by Zhonghe Resources (Namibia) Development (Pty) Ltd., 58% of which is owned by CUC, 42% is owned by a local company.	Operated by Afri-Sino Mining Resources Ltd., 42% of which is owned by CUC. Another Chinese company owns 28%, 30% is owned by a local company.
Project Location	Located in the midwest of Namibia, 200km away from Windhoek, the capital of Namibia, 110km apart from Walvis bay, the biggest deepwater harbor in Africa.	310km away from Harare, the capital of Zimbabwe, near the Mozambique and Zambia border. Has an area of 3450 km^2.
prospecting potential	A great potential in the surrounding and deep of one deposit, indicating good prospecting potential in the project area.	Indicates big prospecting potential.

中核集团 CNNC


安
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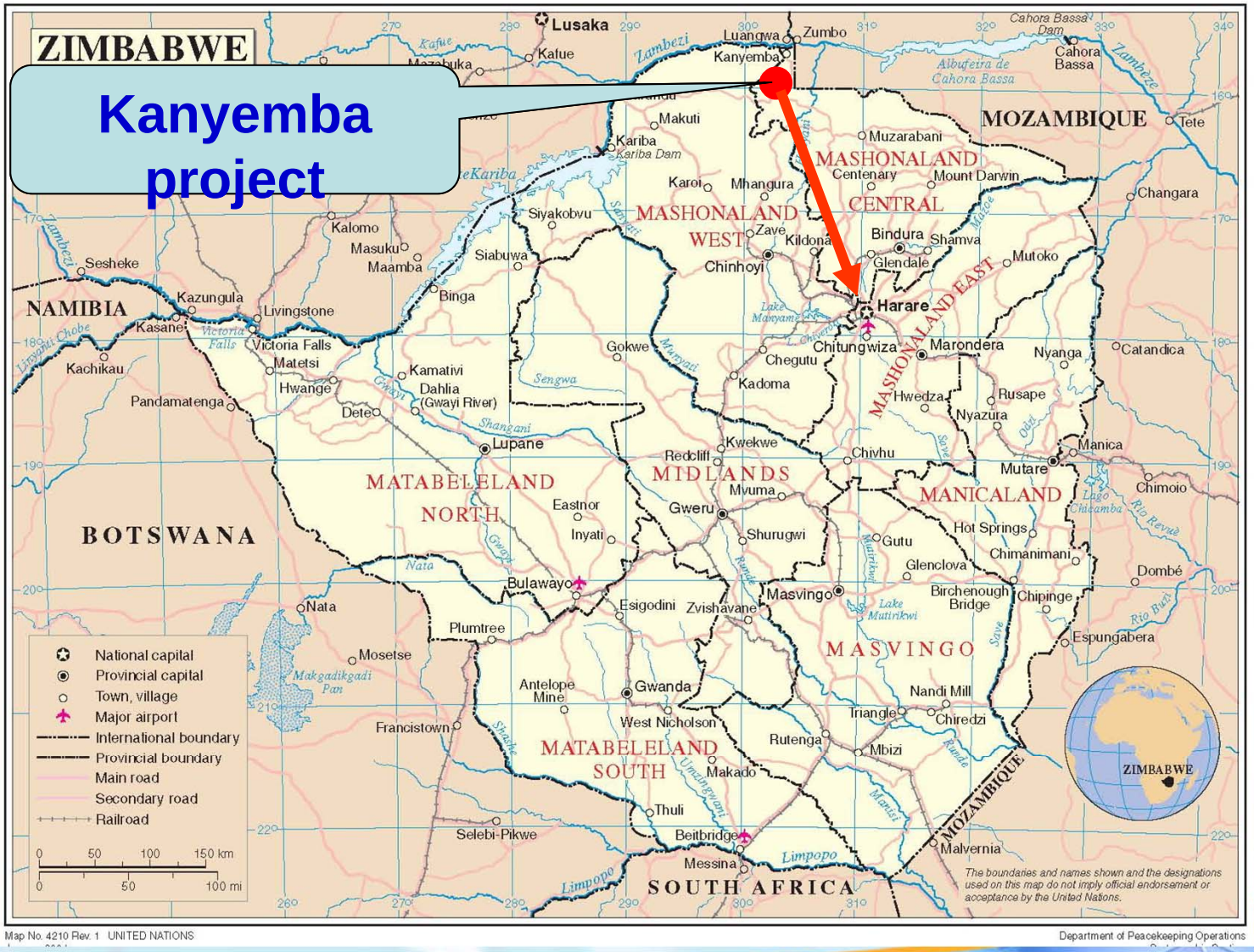
洋
欢乐谷
槟榔湖
NAMIBIA
WINDHOEK
Oshikango
Oshakati
Tsumeb
Grootfontein
Gobabis
Mariental
Keetmanshoop
Katima Mulilo
纳米比亚
Namibia


Kanyemba project
ZIMBABWE
Lusaka
Kafue
Luangwa
Zumbo
Kanyemba
Cahora Bassa Dam
Cahora Bassa
Albufeira de Cahora Bassa
MOZAMBIQUE
Tete
Changara
Makuti
Kariba
Kariba Dam
Muzarabani
MASHONALAND CENTRAL
Centenary
Mount Darwin
Karoi
Mhangura
Siyakobvu
MASHONALAND WEST
Zvave
Kildona
Bindura
Shamva
Glendale
Mutoko
Chinhoyi
Kalomo
Masuku
Maamba
Siabuwa
Binga
Sesheke
NAMIBIA
Kazungula
Livingstone
Kasane
Victoria Falls
Matetsi
Kachikau
Pandamatenga
Hwange
Dete
Kamativi
Dahlia (Gwayi River)
Lupane
Harare
Chitungwiza
Marondera
Nyanga
Catandica
Gokwe
Chegutu
Kadoma
MASHONALAND EAST
Hwedza
Rusape
Nyazura
Kwekwe
Redcliff
Chivhu
Manica
Mutare
Chimoio
MATABELELAND NORTH
MIDLANDS
Mvuma
MANICALAND
Eastnor
Gweru
Inyati
Shurugwi
Hot Springs
Gutu
Chimanimani
Glenclova
Dombé
BOTSWANA
Bulawayo
Masvingo
Birchenough Bridge
Chipinge
Nata
Esigodini
Zvishavane
Plumtree
Espungabera
MASVINGO
Mosetse
Antelope Mine
Gwanda
Nandi Mill
Triangle
Chiredzi
Francistown
West Nicholson
Rutenga
Mbizi
MATABELELAND SOUTH
Makado
Thuli
Selebi-Pikwe
Beitbridge
Malvernia
Messina
SOUTH AFRICA
National capital
Provincial capital
Town, village
Major airport
International boundary
Provincial boundary
Main road
Secondary road
Railroad
0 50 100 150 km
0 50 100 mi
ZIMBABWE
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
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Difficulties

- Lack of experience;
- Costs of production have increased, while market prices have declined;
- Challenging and lengthy regulatory requirements and processes;
- Infrastructure and labour issues in developing countries.

Future

- **China's increasing engagement in the global mining industry**
  - World important uranium producer in the future;
  - Joint Venture might be a better option.
- **Play important role in social Responsibilities**
  - Priority to health and safety;
  - Responsible and respectful of the people and the environment;
  - Remediate the mining sites;
  - Improve the local social and economic fabric.

Thank you for your attention!