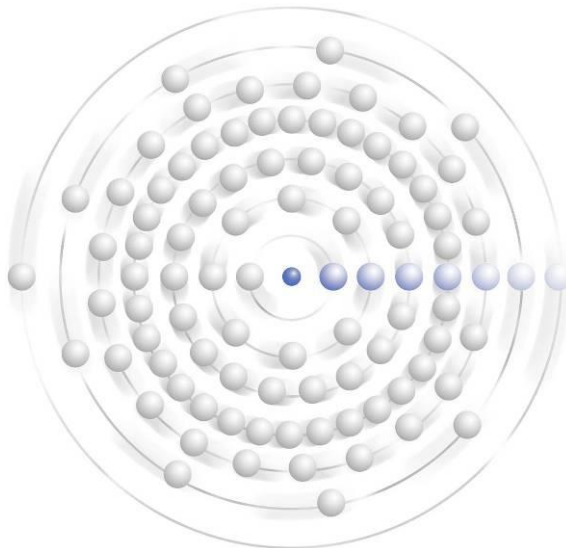




The Changing Geopolitics of the Nuclear Energy Market



China



Ux Consulting
1401 Macy Drive
Roswell, GA 30076
(770) 642-7745
www.uxc.com

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Table of Contents

1 – Introduction	8
Organization of Report	9
• Work in Progress	10
• Note on Taiwan	10
2 – Country Overview	11
History of China	11
Geography and People	12
Government and Politics	13
• Administrative Regions	13
• The Chinese State	14
• Communist Party of China (CPC)	14
• Instruments of State Power	14
• Legal System	15
China's Economy	16
• Impact of Global Financial Crisis	18
• Future Trends and Economic Forecasts	19
International Affairs	20
• Taiwan Straits	20
• China-Japan Competition	21
• Korean Peninsula	21
• Other Regional Issues	21
• Global Position	22
3 – Energy in China	23
Primary Energy	23
Electric Power	24
• Electricity Supply and Demand	24
• Current Capacity and Generation	26
• Future Trends	26
• Transmission Grid	27
Other General Energy Issues	28
• Environment	28
• International Engagements in Energy	28
4 – Overview of China's Civilian Nuclear Program	29
History of Nuclear Power in China	29
Current Status and Future Trends	30
• Future Trends	33
The Legal Framework	34
• Domestic Legislation	34
• International Legal Commitments	35
China's Nuclear Energy Bureaucracy	36
• State Council	36
• National Development and Reform Commission (NDRC)	37
• National Energy Commission (NEC)	37
• China Atomic Energy Authority (CAEA)	37
• State Assets Supervision and Administration Commission (SASAC)	38
• Ministry of Environmental Protection (MEP)	38
• National Nuclear Safety Administration (NNSA)	38
• Academic and Research Institutions	39
China Institute of Atomic Energy (CIAE)	39
Nuclear Power Institute of China (NPIC)	39

5 – China’s Nuclear Industry	40
The Nuclear Troika.....	40
• China National Nuclear Corporation (CNNC)	40
• China Guangdong Nuclear Power Holding Co. Ltd. (CGNPC)	41
• China Power Investment Corporation (CPIC)	41
Other Major Investors.....	42
• Huaneng Power International Inc. (HPI)	42
• China Huadian Corporation (CHC)	42
• Datang International Power Generation Company (Datang Power)	42
• China Guodian Corporation	43
• Hong Kong Nuclear Investment Co. Ltd.....	43
• Guangxi Investment Group (GIG)	43
• China Resources Power Holding Company Limited (CR Power)	43
Reactor Engineering, Construction, and Manufacturing.....	44
• Design and Engineering.....	44
State Nuclear Power Technology Corporation (SNPTC).....	44
Shanghai Nuclear Engineering Research and Design Institute (SNERDI)	44
Guangdong Electric Power Design Institute (GEDI).....	45
CPIC Engineering Company	45
Shandong Electric Power Construction Group/Shandong Nuclear Power Construction Group Corporation (SEPCO)	45
China Nuclear Power Engineering Corporation (CNPE)	45
China Nuclear Power Engineering Co. (CNPEC).....	45
China Nuclear Power Design Company (CNPDC).....	46
CHINERGY Co. Ltd.....	46
• Construction and Project Management.....	46
China Nuclear Engineering and Construction Corporation (CNECC).....	46
China Nuclear Industry Fifth Construction Corporation (CNF)	46
China Nuclear Industry 22 nd Construction Company (CNI 22)	46
China Nuclear Industry 23 rd Construction Corporation (CNI 23).....	47
China Nuclear Industry 24 th Construction Corporation (CNI 24)	47
Hua Xing Construction Company (HXCC)	47
Zhejiang Thermal Power Construction Company (ZTPC)	47
• Heavy Component Manufacturing.....	47
YiZhong (China First Heavy Industries Corporation or CFHI)	47
China National Erzhong Group Co. (China Second Heavy Industries Corporation).....	48
Shanghai Electric Group Company Ltd. (SEC)	48
Dongfang Electric Corporation (DEC)	48
China Xi’an 524 Factory.....	48
Harbin Power Equipment Company Limited (HPEC)	48
Sichuan Sanzhou SCMP Nuclear Equipment Manufacture Incorporation (SNEM).....	49
Shandong Nuclear Power Equipment Manufacturing Co. (SNPEMC)	49
• Other Nuclear Power Enterprises	49
China National Technical IMP & EXP Corp (CNTIC)	49
China Shipbuilding Industry Corporation (CSIC).....	49
6 – China Nuclear Power Strategy and Implementation	50
Main Features of the Strategy	50
International Nuclear Cooperation and Trade	51
• Nuclear Cooperation with the U.S.....	51
• Nuclear Cooperation with Europe	52
• Nuclear Cooperation with Japan and South Korea.....	52
• Nuclear Cooperation with Russia and Central Asia	52
• Nuclear Cooperation with Canada	53
• Nuclear Cooperation with Australia.....	53
• Nuclear Cooperation with Pakistan.....	54
• Nuclear Cooperation with India.....	54
New Nuclear Plant Decision-Making.....	54
• New Nuclear Plant Approvals and Licensing	55
• Prioritization of Projects and Reactor Siting.....	56
• Reactor Technology Selection	56

- Interplay between Government and Industry 57
- Localization and Technology Transfer 59
 - Lingao Project and CPR-1000 60
 - Westinghouse AP1000 62
 - CAP-1400 and Future Designs 63
- International Joint Ventures and Strategic Partnerships 63
 - Shenzhen Nuclear Engineering Co. Ltd. 63
 - AREVA and Dongfang Electric Company 63
 - Alstom and Dongfang Electric Company 64
 - Mitsubishi Heavy Industries and Harbin Group 64
 - Sheffield Forgemasters and Harbin Electric Machinery Company (HEC) 64
 - China Techenergy Co., Ltd. (CTEC) 64
 - Cooperation with the Shaw Group 65
 - Engineering Joint Venture for EPRs 65
- Nuclear Power Project Financing 65
 - Example 1: Daya Bay 66
 - Example 2: Sanmen & Haiyang 67
 - Example 3: Taishan 67
- Human Resources and Training 68
- 7 – China’s Nuclear Power Plants 70**
- China’s “Five Year Plans” 70
- Reactors in Operation 71
 - Qinshan Phase 1 72
 - Daya Bay 73
 - Qinshan Phase 2 74
 - Lingao Phase 1 75
 - Qinshan Phase 3 76
 - Tianwan 77
- Reactors Under or Near Construction 78
 - Lingao Phase 2 79
 - Qinshan Phase 2 Extension 80
 - Yangjiang 81
 - Hongyanhe 82
 - Ningde 83
 - Fuqing 84
 - Fangjiashan 85
 - Sanmen 86
 - Haiyang 87
 - Taishan 88
 - Changjiang 89
 - Tianwan 89
- Planned Nuclear Power Plants 90
 - Hongshiding 91
 - Bailong (Fangchenggang) 91
 - Taohuajiang 92
 - Lianyungang 92
 - Lufeng 93
 - Xianning (Dafan) 93
 - Wuhu 93
 - Jiyang 93
 - Jieyang 93
 - Xudabao 93
 - Xiaomashan 94
 - Pengze 94
 - Nanyang 95
 - Huanren/Hengren 95
 - Guidong 95

• Nanchong.....	95
• Rongcheng.....	95
• Shaoguan.....	95
• Chenzhou.....	95
• Changde.....	96
• Xinjiang.....	96
• Huizhou.....	96
Additional Future NPP Projects.....	96
• Specifics on Certain Future NPPs.....	97
Advanced Reactors.....	99
• Fast Breeder Reactor (FBR).....	99
• High Temperature Reactor (HTR).....	100
Shidaowan Nuclear Power Plant.....	101
• Advanced Reactors in UxC Forecasts.....	102
8 – Nuclear Power Forecasts for China	103
Assessing the 2020 Target.....	103
UxC Nuclear Power Forecasts.....	104
• Reactor Forecasts Overview.....	105
• Base Case Reactor Forecast.....	106
Post-2020 New Reactor Assumptions.....	108
• High Case Reactor Forecast.....	108
• Low Case Reactor Forecast.....	109
Chinese Reactor Market Size Analysis.....	109
Impact of Reactor Forecasts on Nuclear Fuel Requirements.....	111
9 – Nuclear Fuel Cycle Program	112
Uranium Mining and Milling.....	112
• Domestic Supplies.....	113
• Anticipated Demand Growth.....	115
Uranium Requirements Forecasts.....	115
• Participation in the World Market.....	116
Australia.....	116
Niger.....	117
Kazakhstan.....	117
Namibia.....	118
Spot Uranium Market Activity.....	118
Uranium Conversion.....	119
• Domestic Supply.....	119
• Anticipated Demand Growth.....	119
Conversion Requirements Forecasts.....	119
• Participation in the World Market.....	120
Uranium Enrichment.....	120
• Domestic Supply.....	120
• Anticipated Demand Growth.....	122
Enrichment Requirements Forecasts.....	122
• Participation in the World Market.....	122
Nuclear Fuel Fabrication.....	123
• Domestic Supply.....	123
PWR Fuel Supply.....	123
PHWR Fuel Supply.....	124
Nuclear-Grade Zirconium Supply.....	124
• Anticipated Demand Growth.....	125
Fabrication Requirements Forecasts.....	125
• Participation in the World Market.....	126
Back End and Nuclear Waste Issues.....	127
• Interim Spent Fuel Storage.....	127
• Reprocessing and MOX.....	127
• High Level Radioactive Waste.....	128

- Low and Intermediate Level Radioactive Waste..... 128
- 10 – Strategic Analysis and Potential Future Scenarios _____ 129**
- Inherent Strengths..... 130
 - Massive Need for Energy..... 130
 - Ample Resources..... 130
 - Environmental Pressures..... 130
 - Benefits of Technology Transfer 131
 - Global Nuclear Renaissance 131
- Impediments to Growth 131
 - Possibility of Economic Slowdown 131
 - Possibility of Civil Unrest..... 132
 - Possibility of International Conflict 132
 - Potential for Nuclear Accident or loss of Public Confidence 132
 - Financial Constraints and Capacity Building 133
 - Corruption and Mismanagement..... 133
- Potential Future Scenarios..... 134
 - Scenario 1: Most Likely Case 134
 - Scenario 2: Optimistic Case..... 135
 - Scenario 3: Pessimistic Case 136
- 11 – Conclusions _____ 137**
- Glossary _____ 139**
- Appendix A – Timeline of China’s Nuclear Program _____ 146**
- Appendix B – Complete List of Chinese Nuclear Power Plants _____ 148**
- Appendix C – Foreign Suppliers to New Chinese Reactors _____ 151**
- Appendix D – Selected Websites for Chinese Organizations _____ 153**
 - Government Organizations 153
 - Primary Nuclear Power Plant Owners..... 153
 - Nuclear Power Plant Operating Companies..... 153
 - Main Nuclear Plant Investors 154
 - Generation III+ Reactor Technology and Engineering Companies..... 154
 - Construction and Components Manufacturing and Design..... 154
 - Nuclear Fuel Cycle Companies..... 155
 - Nuclear-Related Research Institutes..... 155
 - Nuclear-Related Information Services..... 155

List of Figures

- Figure 1. Map of China 12
- Figure 2. Population Growth of Three Most Populous Countries, 1950-2050..... 12
- Figure 3. China’s Provinces 13
- Figure 4. China’s Nominal Gross Domestic Product (GDP), 1952-2005 16
- Figure 5. China’s 4 Trillion Yuan 2009 Stimulus Package 19
- Figure 6. Economic Forecast for China vs. Other Leading Nations, 2000-2050..... 20
- Figure 7. China’s Total Energy Production in 2006 23
- Figure 8. China’s Oil Production and Consumption, 2000-2030 24
- Figure 9. China’s Electricity Production, 1990-2007 25
- Figure 10. China’s Electricity Production Mix, 1990-2007..... 25
- Figure 11. China’s Electricity Production Mix in 2006 26
- Figure 12. IEA Forecast for China’s Electricity Generation by Fuel, 2005-2030..... 27
- Figure 13. China’s Power Grids..... 27
- Figure 14. Overview Map of China’s Nuclear Power Plants..... 32
- Figure 15. Percentage of New Reactors by Country, 2009-2020..... 33

Figure 16. UxC Q3 Base Case Nuclear Power Forecast: China vs. Rest of World	34
Figure 17. China's Nuclear Bureaucracy	36
Figure 18. Process for NPP Project Proposals to Chinese Authorities	55
Figure 19. CPR-1000 Localization Phases	61
Figure 20. Steam Generator Manufactured by AREVA-DEC for Lingao Phase 2	61
Figure 21. CGNPC Workforce Plans, 2005-2020.....	68
Figure 22. CGNPC University Recruits, 2003-2007	69
Figure 23. Location of China's Operating Nuclear Power Plants	72
Figure 24. Daya Bay Nuclear Power Plant.....	73
Figure 25. Qinshan Phase 2 Nuclear Power Plant.....	74
Figure 26. Lingao Phase 1 Nuclear Power Plant	75
Figure 27. Qinshan Phase 3 Nuclear Power Plant.....	76
Figure 28. Tianwan Nuclear Power Plant.....	77
Figure 29. Location of Chinese Nuclear Power Plants Under or Near Construction	78
Figure 30. Lingao Phase 2 (Units 3 & 4)	79
Figure 31. Extension of Qinshan Phase 2 Extension	80
Figure 32. Yangjiang Nuclear Power Plant (Artist Rendering)	81
Figure 33. Hongyanhe Nuclear Power Plant (Artist Rendering).....	82
Figure 34. Ningde Nuclear Power Plant (Artist Rendering).....	83
Figure 35. Fuqing Nuclear Power Plant Construction (July 2009)	84
Figure 36. Fangjashan Nuclear Power Plant Construction (July 2009)	85
Figure 37. Sanmen Nuclear Power Plant Construction (July 2009).....	86
Figure 38. Haiyang Nuclear Power Plant (Artist Rendering)	87
Figure 39. Taishan Nuclear Power Plant (Artist Rendering)	88
Figure 40. Changjiang Nuclear Power Plant (Artist Rendering).....	89
Figure 41. Location of Chinese Nuclear Power Plants in Planning.....	90
Figure 42. Taohuajiang Nuclear Power Plant (Artist Rendering)	92
Figure 43. Xiaomashan Nuclear Power Plant (Artist Rendering)	94
Figure 44. Pengze Nuclear Power Plant (Artist Rendering).....	94
Figure 45. Location of Additional Future Chinese Nuclear Power Plants	97
Figure 46. China Experimental Fast Reactor	99
Figure 47. HTR-10 Pebble Bed Test Reactor	100
Figure 48. Shidaowan HTR Nuclear Plant (Artist Rendering)	101
Figure 49. China Nuclear Capacity Forecasts Comparison, 2008-2030.....	105
Figure 50. China Nuclear Reactor Unit Forecasts Comparison, 2008-2030.....	106
Figure 51. China Reactor Market Size Forecasts, 2009-2030	110
Figure 52. China Uranium Requirements Forecasts, 2008-2030.....	116
Figure 53. China Conversion Requirements Forecasts, 2008-2030	119
Figure 54. China Enrichment Requirements Forecasts, 2008-2030	122
Figure 55. China PWR Fabrication Requirements Forecasts, 2008-2030	125
Figure 56. Lanzhou Reprocessing Plant	127

List of Tables

Table 1. China's Gross Domestic Product (GDP)	17
Table 2. China's GDP Growth Rates.....	17
Table 3. China's Electricity Production, 1990-2007.....	25
Table 4. China's Operating Nuclear Reactors (as of August 2009)	31
Table 5. Nuclear Reactors Under Construction in China (as of August 2009).....	31
Table 6. AP1000 Localization Plan	62
Table 7. China's Operating Nuclear Reactors (as of August 2009)	72

Table 8. Nuclear Reactors Under Construction in China (as of August 2009).....	79
Table 9. Planned Nuclear Power Plants in China with Established Operating Companies	91
Table 10. UxC High, Base, and Low Case China Nuclear Capacity Forecasts, 2008-2020.....	105
Table 11. UxC High, Base, and Low Case China Reactor Unit Forecasts, 2008-2020	106
Table 12. UxC Base Case China New Reactor Projection, 2009-2020	107
Table 13. UxC New Reactor Construction Forecasts.....	110
Table 14. UxC China Reactor Market Size Forecasts.....	110
Table 15. CNNC Mill/Production Center Summary	114
Table 16. CNNC Mine/Project Summary.....	114
Table 17. CNNC Projected Production Based On Ownership Share.....	114
Table 18. UxC Uranium Requirements Forecasts for China	116
Table 19. UxC Conversion Requirements Forecasts for China	120
Table 20. UxC Enrichment Requirements Forecasts for China	122
Table 21. UxC PWR Fabrication Requirements Forecasts for China	126
Table A-1. Timeline of China's Nuclear Industry, 1970-2009.....	146
Table B-1. Complete List of Chinese Nuclear Power Plants	148
Table C-1. Foreign Suppliers to New Chinese Nuclear Reactors	151
Table C-2. Key Component Supply for Selected Chinese Reactors	152

1 – Introduction

The motivation for our study, *The Changing Geopolitics of the Nuclear Energy Market*, is to examine the dramatic shift that is taking place in the nuclear energy market from the standpoint of not only expected growth in nuclear capacity and demand for nuclear technology and materials, but also in terms of geography and international political considerations. Nuclear power is expected to grow rapidly in the East in order to meet the growing electricity needs in certain Asian nations, and this creates associated demand for reactor components and nuclear fuel, impacting prices and supply availability.

With aggressive plans for its nuclear energy program, China has become the focal point of the international nuclear industry. Nowhere else in the world today are there so many nuclear power plants being built and so many more under consideration. The goal of this report is to provide a comprehensive study on China's nuclear energy program, emphasizing its nuclear reactor projects, evaluating implementation of these projects, and drawing lessons from the country's nuclear energy goals. A solid understanding of China's nuclear energy program is of the utmost importance for those who are taking part in the country's nuclear energy program as well as interested stakeholders looking for market opportunities in the country.

No country in the world comes close to matching China's plans for nuclear power expansion. China's latest official target of reaching 5% of total electricity from nuclear plants by 2020 means that around 78 gigawatts-electric (GWe) of new nuclear capacity should be built over the coming decade – adding to the current 8.6 GWe. In fact, given current trends, China is on track to potentially becoming the world's largest user of nuclear power by the year 2030. China's tremendous new reactor numbers speak for themselves:

- 11 reactors in operation (8,602 MWe)
- 16 reactors under construction today for a total of 15 GWe in new capacity
- 250+ planned new reactors
- 70+ identified reactor sites
- 5 main owner/operating companies and 34 secondary owners identified

This report has been prepared using several sources of information, including primary research in the form of contacts with experts on the Chinese nuclear energy program, as well as detailed research of industry publications, industry websites, company reports and press releases, proceedings of international conferences, reports published by specialized international organizations, and news reports. UxC has made major efforts to confirm all the information provided in this report. UxC has gathered all available data to provide the reader with a reliable single source of information on the

Chinese nuclear energy program. It must be mentioned, however, that although information about China's nuclear energy program is accessible, there are still areas where questions need to be answered. Given the size and speed of the developments in China's nuclear power program, it is not surprising that many aspects continue to evolve and new information adds to our understanding of China's nuclear future.

The importance of China for the global nuclear industry can not be underestimated. Ultimately, with this report, UxC hopes to provide readers with a sound understanding of the Chinese nuclear energy program and a glimpse of its future.

Organization of Report

This report starts with a review of the broader national and energy issues impacting China's future, and then focuses in later sections on the specific aspects of China's nuclear power program and its future direction. The report is organized as follows:

Chapter 2 – Country Overview provides an overview of China, including information on its geography, people, government, economy, and international relations. Here, we examine some detail how the economic development in China is impacting the prospects for nuclear power expansion in the country.

In **Chapter 3 – Energy in China**, we examine the role that energy plays in China's economy, and the specific situation of the electric power sector in supporting China's rapid development.

Chapter 4 – Overview of China's Civilian Nuclear Program introduces the broad outlines of China's nuclear power program, including the history of nuclear power in China, and the role played by the various key government agencies in shaping this important sector.

Chapter 5 – China's Nuclear Industry reviews all the main industrial players in the nuclear power program, both state-owned and private sector companies.

Chapter 6 – China Nuclear Power Strategy and Implementation examines the government's goals for nuclear power deployment in China and the approaches being taken to implement this vision.

Chapter 7 – China's Nuclear Power Plants details each of the reactors that are now in operation, under construction, and planned in China.

Chapter 8 – Nuclear Power Forecasts for China provides UxC's expert analysis of China's nuclear power targets and explains our reactor forecasts for the country through 2030. This chapter also includes an analysis of the anticipated reactor market size (in U.S. dollars) for China's growing nuclear power program.

Chapter 9 – Nuclear Fuel Cycle Program details each of the primary sectors in China's nuclear fuel cycle, including the country's capabilities in uranium mining, conversion, enrichment, fuel fabrication, reprocessing and other aspects of the back-end of the fuel cycle. In addition, this chapter provides UxC's forecasts for current

and future demand of each nuclear fuel component utilizing our reactor forecasts and proprietary UxC Requirements Model (URM).

Chapter 10 – Strategic Analysis and Potential Future Scenarios provides a look at key strengths that could help China’s nuclear program expand in the future along with potential hurdles and also makes predictions on the rate of China’s nuclear program expansion by 2020 and 2030, with high, base, and low case scenarios.

Chapter 11 – Conclusions offers our overall conclusions to this in-depth analysis of China’s nuclear power program.

In addition, there is a helpful **Glossary** as well as four appendices, which include additional useful information and data. **Appendix A** is a timeline of key events in China’s commercial nuclear power program development. **Appendix B** provides a complete list of all nuclear power plants in China (operating, under construction, planned, and future). **Appendix C** includes additional information on the supply chain and major foreign suppliers for China’s rapidly expanding nuclear reactor program. **Appendix D** provides links to the websites of key government organizations and companies that participate in the nation’s nuclear industry.

- **Work in Progress**

It should be understood that our study of China’s situation is very much a work in progress. Constant changes are taking place in China in terms of demand, supply capacity, government and business structure. Along with providing information on China’s current nuclear power situation, our intention is for this report to give the reader a framework to view these changes as well as an indication of where things are headed in the future. In conjunction with the other reports in this *Geopolitics Series*, the aim is for the reader to gain an appreciation of the important ways that the nuclear energy markets are evolving, especially with the much greater emphasis on growth in Asia. In addition to our *Geopolitical Series*, UxC is also expanding and enhancing coverage of the latest policy and related developments in key countries, such as China, through our *Policy Watch* briefing service. In addition, given the rapid changes in China’s nuclear power plant program, UxC’s *Nuclear Power Outlook* reports provide the most comprehensive and up-to-date coverage of the latest developments in terms of reactor projects and future nuclear capacity forecasts for both China and the world on a quarterly basis.

- **Note on Taiwan**

Please note that this study only covers aspects of the nuclear power program in the country of the People’s Republic of China (PRC) and does not discuss the nuclear power situation in the Republic of China (ROC), otherwise known as Taiwan.