## Contents

1 The History of Chinese Oil Industry Development .......................... 1
   1.1 Brief History of Oil in Ancient China .......................... 1
       1.1.1 Discovery Records of Fossil Fuels in China ............ 1
       1.1.2 Early Application of Fossil Fuels in China ............ 2
       1.1.3 Development of Drilling Technology in China ............ 2
   1.2 The First Stage of the Chinese Oil Industry (1877–1949) ......... 3
   1.3 The Second Stage of the Chinese Oil Industry (1949–1978) ....... 5
   1.4 The Third Stage of the Chinese Oil Industry (1978–1998) ....... 7
   1.5 Vital Oil Fields in the History of the Chinese Oil Industry ....... 9
       1.5.1 Daqing Oil Field ..................................... 9
       1.5.2 Shengli Oil Field .................................... 10
       1.5.3 Changqing Oil Field .................................. 11
       1.5.4 Yanchang Oil Field .................................. 11
       1.5.5 Xinjiang Oil Field ................................... 12
       1.5.6 Tarim Oil Field .................................... 12
       1.5.7 Tahe Oil Field .................................... 13
       1.5.8 Liaohe Oil Field .................................... 13
       1.5.9 Jilin Oil Field ..................................... 13
       1.5.10 Dagang Oil Field ................................... 14
       1.5.11 Bohai Oil Field .................................... 14
       1.5.12 Huabei Oil Field ................................... 14
       1.5.13 Zhongyuan Oil Field ................................ 15
       1.5.14 Southwest Oil and Natural Gas Field .................... 15

2 Developmental Features of the Chinese Petroleum Industry in Recent Years ........................................ 17
   2.1 Exploration and Development of Petroleum in China .............. 17
       2.1.1 The Progress of Exploration and Development .......... 17
       2.1.2 Evaluation of Oil and Gas Resources in China ............ 18
2.2 Production and Consumption of Petroleum in China ................. 20
2.3 Development of Oil Pipelines in China ................................ 25
  2.3.1 China’s Oil Pipeline Development (1988–2010) .................. 26
2.4 Refining and Marketing Oil in China .................................. 28
2.5 Refined Oil Market ................................................. 30
  2.5.1 Supply and Demand of Refined Oil .............................. 30
  2.5.2 Price Mechanism of Crude Oil and Refined Oil ............... 32
2.6 International Cooperation ......................................... 33
  2.6.1 Development of International Cooperation of Chinese Petroleum Companies ...................................... 33
2.7 Role of Technology in the Petroleum Industry of China ............. 39
  2.7.1 Achievements of Research on Geological Theory in China .... 40
  2.7.2 Achievements of Exploration Technologies in China .......... 40
  2.7.3 Achievements of Other Technologies in China ................. 41
2.8 Energy Conservation, CO₂ Emissions Reduction and Renewable Energy ............................................. 42
3 Possible Trends of Chinese Oil Supply Through 2030 .................. 47
  3.1 Forecast of Chinese Oil Production ................................ 47
    3.1.1 Weng Model ................................................. 47
    3.1.2 Generalized Weng Model .................................... 48
    3.1.3 Weibull Model .............................................. 48
    3.1.4 HCZ Model .................................................. 49
    3.1.5 HC Model .................................................... 50
    3.1.6 Lognormal Distribution Model .............................. 50
    3.1.7 t Model .................................................... 51
    3.1.8 Generalized and Unified Oil and Gas Production Forecasting Model ............................................. 51
    3.1.9 Multi-cycle Model ......................................... 52
  3.2 The Forecast of Ultimate Recoverable Reserves and Oil Production in China ............................................. 53
  3.3 Analyzing Chinese Oil Imports based on the Export Capacity of the World’s Oil Producing Nations ............. 58
    3.3.1 The Importance of Analyzing Chinese Oil Imports ......... 58
    3.3.2 Oil Production Forecasting Model and Oil Consumption Model ............................................. 58
    3.3.3 Forecast of the World’s Oil Export Capacity .............. 59
    3.3.4 Forecast and Analysis of Chinese Oil Production and Consumption ............................................. 64
  3.4 The Academic Peak Oil Debate in China ............................ 66
## 4 Comprehensive Analysis of the Energy Return on Investment (EROI) of China

4.1 Introduction to EROI .................................................... 71
4.2 Similar Indices Used in China ........................................ 72
4.3 EROI Methodology ..................................................... 74
  4.3.1 Formulas for EROI ................................................ 74
  4.3.2 Energy Intensity ................................................... 75
  4.3.3 Correcting for Energy Quality ................................. 76
4.4 Application 1: EROI of China’s Oil and Natural Gas Extraction ........................................ 77
   4.4.1 The Numerator: Energy Outputs ............................... 77
   4.4.2 The Denominator: Energy Inputs ............................. 78
   4.4.3 Results .......................................................... 79
4.5 Application 2: EROI of China’s Largest Oil Field-Daqing .................................................. 82
   4.5.1 The Numerator: Energy Outputs ............................... 83
   4.5.2 The Denominator: Energy Inputs ............................. 84
   4.5.3 Results .......................................................... 86

## 5 Summary

5.1 The Importance of Energy to China’s Economy .................................................. 91
5.2 The Future for Fossil Fuel Supply to China .................................................... 92
   5.2.1 Oil .............................................................. 92
   5.2.2 Natural Gas .................................................... 93
   5.2.3 Coal ........................................................... 94
5.3 Restrictions of Energy on Chinese Economic Growth in the Future.................................. 95
   5.3.1 Peak Fossil Fuels .............................................. 95
   5.3.2 Decline EROI .................................................. 96
   5.3.3 Energy Efficiency .............................................. 97

References ................................................................. 101

Appendix ................................................................. 109

Index ................................................................. 111
The Chinese Oil Industry
History and Future
2013, XV, 113 p. 47 illus., 33 illus. in color., Softcover
ISBN: 978-1-4419-9409-7