

2007 deep research report on China solar grade multicrystal silicon industry

hard copy : USD2000

electronic copy : USD2500

hard+electronic copy : USD3000

pages: 170

tables and figures : 131

words : 750000 words

published data : Mar 14,2007

Publisher: QY Research Solar Energy Research Center

Contact: Mr. Zhangdong 86+13811796901 8610-64836516 qy@qyresearch.com

Summary:

《2007 deep research report on China solar grade multicrystal silicon industry》 was completed by QYresearch solar industry research center for more than 3 months, it is a deeply research report on China and Global solar grade poly silicon industry. In the report, we introduced their productions and sales from 2004-2011 for China and Global market, poly silicon manufacture technology history, today, and future low cost technology. Give detail information analyst on experimental technology of poly silicon.(especially low cost technology), what is more, we also introduce the building and planning projects of China and global poly silicon factories. And we also give our remark or opinion on the planning or building project whether succeed of the factories yield technology. According these analyst we can give good forecast of poly silicon products demand sales and shortage data in the coming 5 years(2007-2011). Though almost all biggest poly silicon vendor expanded their production capacity these years, there are also a lot shortage of global poly silicon, so more and more new enter come in this industry and all of them need manufacture technology, but almost all the biggest vendor will not transfer their technology to others, so the new enter need develop their own technology, but as we all know, it is not an easy thing to develop a new technology for poly silicon manufacture, so this largely limited the product expanding of poly silicon. While China three best poly silicon manufacture(Luoyang Zhonggui, Sichuan Xinguang Silicon Industry and Emei Semiconductor) settle more technology difficulty and manufacture poly silicon succeed in China, especially Xinguang Silicon Industry 1260tons project was greatly increase China new enter confident of their projects succeed. But things is not easy as we can image, in the report, there are 8 projects will be detail survey and analyst.

Tables and contents:

Part One poly silicon industry overview 1

1.1 Definition 1

1.2 Classification and use 2

1.3 Industry Chain Structure	3
1.4 Difference between Multi-crystal and Single-crystal silicon	7
Part Two Manufacture technology and Processes of poly silicon	11
2.1 technology overview	11
2.1.1 Technical type and distribution	11
2.1.2 Technical type in China and Global poly silicon vendors	13
2.2 Polysilicon manufacture processes	20
2.3 Singlecrystalline & Multicrystalline Silicon Ingot Pulls the crystal growth craft	31
2.4 wafer Growth craft	42
Part Three Multi-crystal productions providers sales demand status and forecast from 2007-2011	50
3.1 productions overview	50
3.1.1 traditional 7Giants productions	50
3.1.2 EU USA Korea 7 new poly silicon projects productions	51
3.1.3 Japan Russia 4 new poly silicon project productions	51
3.1.4 China 11 new poly silicon projects productions	52
3.1.5 Global total poly silicon productions from 2004-2011	53
3.1.6 Electronic Grade poly silicon productions from 2004-2011	54
3.1.7 Solar grade poly silicon productions from 2004-2011	55
3.2 market demand overview	55
3.2.1 solar cell productions overview	55
3.2.2 solar grade poly silicon demand from 2004-2011	60
3.2.3 electronic grade poly silicon demand from 2004-2011	61
3.2.4 poly silicon shortage from 2004-2011	61
Part Four traditional 7 giants of poly silicon	64
4.1 Hemlock (USA)	65
4.2 REC (AsiMI+SGS) (NORWAY)	68
4.2.1 REC (AsiMI) (USA)	72
4.2.2 REC (SGS) (USA)	73
4.3 Wacker Chemie (GERMAN)	73
4.4 Tokuyama (JAPAN)	79
4.5 MEMC ElectronicMaterials (USA+ITALY)	84
4.6 Mitsubishi Materials (JAPAN)	87
4.6.1 Mitsubishi Materials (JAPAN)	90
4.6.2 Mitsubishi Polucrystalline Materials (USA)	91
4.7 Sumitomo Titanium (JAPAN)	91
Part Five China Three poly silicon vendor	97
5.1 Xinguang Guiye (Sichuang Leshan city)	98
5.2 Emei Semiconductor Material Plant (Sichuan Emeishan city)	102

5.3 Luoyang Zhonggui (Henan Luoyang) 105

Part Six International poly silicon building and planning projects	108
6.1 JFE (NKK+Kawasaki) (Japan)	108
6.2 JSSI (German)	111
6.3 ELKEM (Norway)	112
6.4 DC Chemical (Korea)	113
6.5 Crystal Systems (USA)	115
6.6 Isofotón and Endesa (Spain)	118
6.7 Hoku Materials (USA)	118
6.8 PPT etc (France)	120
6.9 NSC (Japan)	121
6.10 M.SETEK (Japan)	122
6.11 Г о р н о - х и м и ч е с к и й к о м б и н а т (Г Х К) (Russia Zheleznogorsk city)	124
6.11 Other projects (Russia and Ukraine etc)	125
Part Seven China poly silicon building and planning projects	126
7.1 Shenzhen Nanbo (Hubei Yichang city)	126
7.2 Asia silicon (Qinghai Xining city)	128
7.3 Ningxia Solar (Ningxai Shizuishan city)	130
7.5 Jiangsu Shunda (Jiangsu Yangzhou city)	132
7.6 Jiangsu Zhongneng (Jiangsu Xuzhou city)	136
7.7 Chaolei Industry (Sichuang Guangyuan city)	138
7.8 Aixin Silicon Tech (Yunnan Qujin city)	142
7.9 Tongwei and Juxing (Sichuan Leshan city)	147
7.10 Other projects	151
7.10.1 Beijing Shunsa New Energy etc (Sichuan Meishan city)	151
7.10.2 Green Energu(UK) investment etc (Sichuan Meishan city)	152
7.10.3 Shanghai Industry Investment etc (Heilongjiang Maodanjiang city)	152
7.10.4 Other planning projects (Liaoning Inner Mongolia etc)	153
Part Eight Global poly silicon supply chain research	157
8.1 electronic grade poly silicon supply chain system	157
8.2 solar grade poly silicon supply chain system	158
Part Nine Feasibility analysis of China new poly silicon projects	160
9.1 Possible technology source	160
9.2 China poly silicon project SWOT analysis	162
Part Ten Conclusions	163

Some Tables and Figures:

Table Difference of EG and SG poly silicon 2

Table MG/SG/EG Purity and their 2006 ASP (USD/KG) 3

Figure poly silicon industry chain structure 4

Figure poly silicon manufacture process flow (sand—poly silicon) 4

Table MG silicon production and ASP (USD/KG) 7

Table Difference between single and multi-crystal silicon 7

Table 2006 productions of global different type technology and their market share 12

Table Global 12 vendors and their technology 14

Table Global 7giants poly silicon manufacture processes and their chemical theory 15

Figure JFE (NKK +Kawasaki) Physics poly silicon process flow 18

Figure JFE (NKK +Kawasaki) Physics way and Siemens way difference 19

Table Manufacture process flow of Siemens way 20

Figure MG silicon process flow 24

Figure MG silicon structure 25

Figure wafer-IC manufacture processes 29

Figure Pulls the crystal stove working Principle and structure 31

Figure CZ single crystal Pulls the crystal manufacture way and structure 32

Figure FZ single crystal Pulls the crystal manufacture way and structure 34

Table Difference of CZ and FZ 35

Figure DSS Multicrystalline Silicon Ingot manufacture way and structure 36

Figure Electromagnetic Casting, EMC Multicrystalline Silicon Ingot manufacture way and structure 37

Figure EMC Multicrystalline Silicon Ingot processes 38

Table Difference of DSS/FZ/CZ/EMC etc Silicon Ingot processes 39

Figure polycrystalline silicon ingot product Parameter 40

Figure Polysilicon-Multicrystalsilicon wafer-solar cell processes 41

Figure Multicrystal silicon-wafer processes 47

Figure wafer---solar cell processes (180um) 47

Figure 2001-2006 global wafer shipments (100 million square inch) and sales (100 million USD) 48

Figure 2004-2011 poly silicon productions and increase rate of global 7 giants 50

Figure 2007-2011 poly silicon productions and increase rate of EU USA Korea 7 projects 51

Figure 2006-2011 poly silicon productions and increase rate of Japan Russia 4 projects 52

Figure 2004-2011 poly silicon productions and increase rate of China 11 projects 52

Table 2004-2011 poly silicon productions and increase rate of global EG and SG poly silicon 53

Figure 2004-2011 global poly silicon productions and increase rate 53

Figure 2004-2011global EG poly silicon productions and increase rate 54

Figure 2004-2011global SG poly silicon productions and increase rate 55

Table 2004-2011global solar cell/module/crystal silicon cell/thin film cell productions and cell module system ASP(USD/Wg)Table 55

Figure 2004-2011global solar cell/ module (GW) and increase rate 56

Figure 2004-2011 global crystal silicon solar cell/ module (GW) and increase rate 57

Figure 2004-2011 global thin film solar cell/ module (GW) and increase rate	57
Table 2004-2011 global poly silicon demand(tons) and increase rate	60
Table 2004-2011 global EG poly silicon demand(tons) and increase rate	61
Table 2004-2011 global SG poly silicon demand(tons) and increase rate	61
Table 2002-2011 China poly silicon shortage(tons)	63
Table 2004-2011 global 7 giants poly silicon productions(tons)	64
Table 2004-2011 global 7 giants EG poly silicon productions(tons)	64
Table 2004-2011 global 7 giants SG poly silicon productions(tons)	64
Table Hemlock company information Table (shareholders, management team, products, clients etc 11 items)	65
Table 2004-2011 Hemlock poly silicon productions (tons) and EG/SG poly silicon productions	66
Figure 2004-2011 Hemlock poly silicon products(tons) and increase rate	67
Table REC company information table(shareholders,management team,products,clients etc 11 items)	68
Table 2004-2011 REC Silicon poly silicon productions (tons) and EG/SG poly silicon productions	70
Figure 2004-2011 REC Silicon poly silicon products(tons) and increase rate	71
Table 2005Q4-2006Q4 REC Silicon REC Wafer REC Solar department quartly revenue and their profit	71
Table Wacker Chemie AG company information table(shareholders,management team,products,clients etc 11 items)	74
Table 2004-2006 Wacker finance data and business department revenue	76
Table 2004-2011 Wacker Chemie AG poly silicon productions (tons) and EG/SG poly silicon productions	78
Figure 2004-2011 Wacker poly silicon products(tons) and increase rate	79
Table Tokuyama company information table(shareholders,management team,products,clients etc 11 items)	79
Table Tokuyama 05 and 06 3Q sales revenue of business department	81
Figure Tokuyama Diagram of production from silica stone to polycrystalline silicon and finished product	82
Table 2004-2011 Tokuyama poly silicon productions(tons) and their EG SG productions	83
Figure 2004-2011 Tokuyama poly silicon products(tons) and increase rate	83
Table MEMC Electronic Materials company information table(shareholders,management team,products,clients etc 11 items)	84
Table 2003-2006 MEMC finance data	85
Table 2004-2011 MEMC Electronic Materials poly silicon productions(tons) and their EG SG productions	86
Figure 2004-2011 MEMC poly silicon products(tons) and increase rate	87
Table Mitsubishi Materials company information table(shareholders,management team,products,clients etc 11 items)	87
Table 2004-2011 Mitsubishi Materials poly silicon productions(tons) and their EG SG productions	89
Figure 2004-2011 Mitsubishi Materials poly silicon products(tons) and increase rate	90

Table Sumitomo Titanium company information table (shareholders, management team, products, clients etc 11 items) 91

Table 2004-2011 年 Sumitomo Titanium poly silicon productions (tons) and their EG SG productions 92

Figure 2004-2011 Sumitomo Titanium poly silicon products (tons) and increase rate 93

Table 2004-2011 China Xinguang Silicon/Emei Semiconductor/Luoyang Zhonggui poly silicon productions 97

Table Sichuan Xinguang Silicon company information table (shareholders, management team, products, clients etc 11 items) 98

Table Sichuan Xinguang Silicon share holder structure 99

Table Sichuan Xinguang Silicon share holders 99

Figure 2007-2011 Sichuan Xinguang Silicon poly silicon products (tons) and increase rate 101

Table Emei Semiconductor Material Plant company information table (shareholders, management team, products, clients etc 11 items) 102

Figure 2004-2011 Emei Semiconductor Material Plant poly silicon products (tons) and increase rate 105

Table Luoyang Zhonggui company information table (shareholders, management team, products, clients etc 11 items) 105

Figure 2005-2011 Luoyang Zhonggui poly silicon products (tons) and increase rate 106

Table 2008-2011 poly silicon products (tons) of EU USA Korea 7 projects 108

Table 2006-2011 poly silicon products (tons) of Japan Russia 4 projects 108

Table JFE Steel company information table (shareholders, management team, products, clients etc 11 items) 109

Table JFE share holder structure 110

Figure 2006-2011 JFE Steel poly silicon products (tons) and increase rate 111

Table JSSI poly silicon project information (share holder, factory location, invest and capacity plan etc) 111

Figure 2008-2011 JSSI poly silicon products (tons) and increase rate 112

Table Elkem AS poly silicon project information (share holder, factory location, invest and capacity plan etc) 113

Table DC Chemical Co., Ltd poly silicon project information (share holder, factory location, invest and capacity plan etc) 114

Figure 2008-2011 DC Chemical poly silicon products (tons) and increase rate 115

Figure 2008-2011 Crystal Systems poly silicon products (tons) and increase rate 116

Figure 2009-2011 Isofotón and Endesa poly silicon products (tons) and increase rate 118

Figure 2009-2011 Hoku Materials poly silicon products (tons) and increase rate 119

Figure 2009-2011 PPT etc poly silicon products (tons) and increase rate 121

Figure 2009-2011 NSC poly silicon products (tons) and increase rate 122

Figure 2009-2011 M.SETEK poly silicon products (tons) and increase rate 123

Figure 2009-2011 Russia Γ X K poly silicon products (tons) and increase rate 124

Table 2008-2011 China 8 projects poly silicon productions (tons) 126

Figure 2008-2011 Shenzhen Nanbo poly silicon products (tons) and increase rate 128

Figure 2008-2011 Aisa Silicon poly silicon products (tons) and increase rate 130

Figure 2008-2011 Ningxia Solar poly silicon products (tons) and increase rate 131

Figure 2008-2011 Jiangsu Suhnda poly silicon products(tons) and increase rate	133
Figure 2008-2011 Jiangsu Zhongneng poly silicon products(tons) and increase rate	137
Figure 2008-2011 Chaolei Industry poly silicon products(tons) and increase rate	142
Figure 2009-2011 Aixin Silicon Tech poly silicon products(tons) and increase rate	146
Figure 2008-2011 Tongwei and Juxing poly silicon products(tons) and increase rate	151
Figure 2006 poly silicon production distributing of EU USA Japan	157
Figure 2006 EG poly silicon production distributing of EU USA Japan	158
Figure 2006 SG poly silicon production distributing of EU USA Japan	159
Table Solar grade poly silicon new process technology	160
Table China poly silicon projects SWOT analysis	162