

德国光伏产业链详解

1、德国光伏生产制造企业

(1)、德国光伏生产制造企业情况

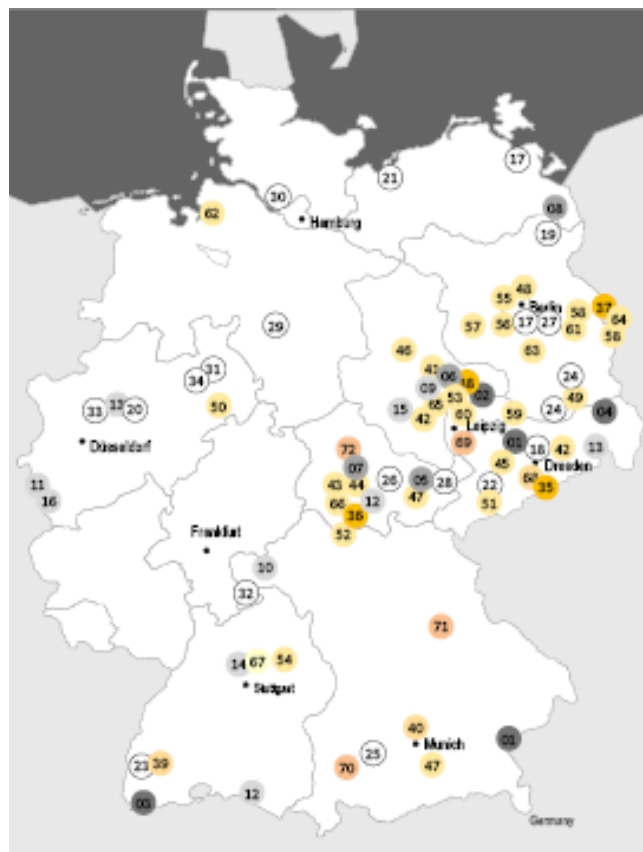
序号	公司名称	地址	2010年产能 (MWp)	员工
硅 (Silicon) :				
1	Wacker Chemie	Burghausen, Nünchritz	25,000t	1520
2	PV Crystalox Solar Silicon	Bitterfeld-Wolfen	1,800t	100
3	Joint Solar Silicon	Rheinfelden	850t	n/a
4	Schmid Pilot Production	Spreewitz	540t	20
硅片 (Wafer) :				
5	SCHOTT Solar Wafer	Jena	300	400
6	Q-Cells	Bitterfeld-Wolfen	n/a	1500
7	PV Crystalox	Erfurt	n/a	145
8	Mola Solaire Produktion	Pasewalk	n/a	120
电池 (Cell) :				
9	Q-Cells	Bitterfeld-Wolfen	500	1500
10	SCHOTT Solar	Alzenau	305	520
11	Solland Solar Cells	Aachen	170	300
12	Sunways	Konstanz, Arnstadt	116	330
13	ARISE Technologies	Bischofswerda, Gelsenkirchen	107	150
14	Systaic	Heilbronn	25	55
15	ITS Innotech Solar	Halle1	-	n/a
16	TSCC	Aachen1	-	n/a
组件 (Module) :				
17	SOLON	Berlin, Greifswald	260	650
18	SOLARWATT	Dresden	185	430
19	aleo solar(Bosch)	Prenzlau	180	600
20	Scheuten Solar Technology	Gelsenkirchen	175	350
21	CENTROSOLAR	Wismar	150	450
22	Heckert Solar	Chemnitz	150	240
23	Solar-Fabrik	Freiburg	135	350
24	ALGATEC Solar	Prösen, Großschön	130	202
25	Webasto Solar(Systaic)	Landsberg/Lech	60	30
26	asola	Erfurt	45	130

27	arinna	Berlin	20	70
28	GSS	Korbußen	20	50
29	alfasolar	Hannover	20	40
30	solarnova	Wedel	15	35
31	Schüco Solar	Bielefeld	5	40
32	Sunovation	Klingenberg	<1	5
33	Sunware	Duisburg	<1	20
34	Wulfmeier Solar	Bielefeld	<1	5
集成（硅片/电池/组件）(Wafer/Cell/ Module):				
35	SolarWorld	Freiberg	1000/250/450	1330
36	Bosch Solar Energy	Arnstadt	400/430/n/a1	1220
37	Conergy	Frankfurt(Oder)	200/250/250	650
38	Sovello	Bitterfeld-Wolfen	180/180/180	1200
聚光光伏（CPV）：				
39	Concentrix Solar	Freiburg	25	60
40	SolarTec International	Aschheim	n/a	25
薄膜（Thin Film -Poly-Si）：				
41	CSG Solar	Bitterfeld-Wolfen	n/a	40
薄膜（a-Si, a-Si/μc-Si）：				
42	Sunfilm	Großdörfel, Bitterfeld-Wolfen	145	400
43	Masdar PV	Ichtershausen	40	170
44	Bosch Thin Film	Erfurt	40	195
45	Signet Solar	Mochau	37	160
46	Malibu(E.ON, Schüco)	Osterweddingen	35	120
47	SCHOTT Solar Thin Film	Jena,Putzbrunn	35	200
48	Inventux	Berlin	33	190
49	EPV SOLAR	Senftenberg	30	110
50	CENTROSOLAR	Paderborn	10	50
51	CTS Tandem Solar	Chemnitz	-	n/a
52	Extentec	Queienfeld	-	n/a
薄膜（CIS/ CIGS/ CIGSSe）：				
53	Solibro(Q-Cells)	Bitterfeld-Wolfen	135	300
54	Würth Solar	Schwäbisch Hall	40	230
55	Global Solar	Berlin	35	100
56	Sulfurcell	Berlin	35	250
57	Johanna Solar Tech, (Bosch)	Brandenburg	30	130
58	Odersun	Frankfurt(Oder), Fürstenwalde	25	200
59	AVANCIS	Torgau	20	180
60	Solarion	Leipzig	Pilot	35

61	PVflex Solar	Fürstenwalde	Pilot	35
62	CIS Solartechnik	Bremerhaven	Pilot	25
63	Nanosolar	Luckenwalde	n/a	n/a
薄膜CdTe) :				
64	First Solar	Frankfurt(Oder)	212	600
65	Calyxo(Q-Cells)	Bitterfeld-Wolfen	25	140
66	ANTEC Solar	Arnstadt1	n/a	n/a
砷化镓 (GaAs) :				
67	Azur Space	Heilbronn	100	110
有机太阳能电池 (OPV) :				
68	heliatek	Dresden1	-	30
光伏&热能(PV& Thermal):				
69	solarhybrid	Markranst ädt	n/a	50
70	Solarzentrum Allg äu	Altdorf-Biessenhofen	n/a	100
71	Grammer Solar	Amberg	n/a	45
72	Heli Solar	Blankenburg1	n/a	5

数据来源: iea-pvps

(2)、德国光伏生产制造企业地理分布图



数据来源: BSW

2、德国太阳能系统零部件生产制造企业

太阳能系统零部件包括逆变器、线缆、连接器和光伏接线盒等部件。“德国制造”的太阳能系统零部件，无论在可靠性还是在性能方面都享有很高的国际声誉。欧洲市场销售的逆变器 85%为德国制造，德国希望在这一市场能够继续保持这一领先优势。

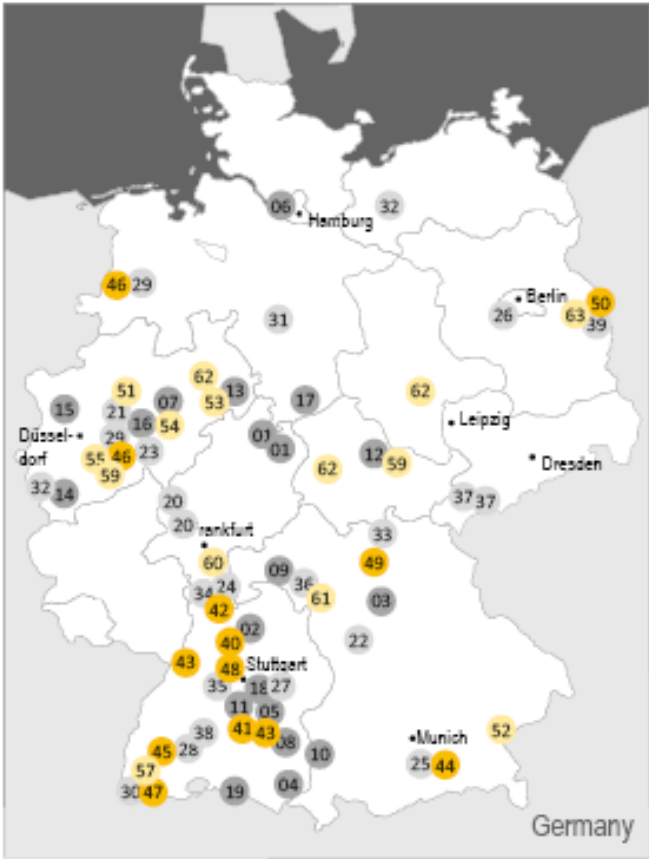
（1）、德国太阳能系统零部件生产制造企业情况

序号	厂商	地址	2010 年产能 (MWP)	员工
光伏逆变器 (Inverters) :				
1	SMA Solar Technology	Niestetal, Kassel	10000	4000
2	KACO new energy	Neckarsulm	1200	350
3	Siemens Industry Automation	Fürth	950	n/a
4	Diehl AKO	Wangen	700	140
5	Solutronic	Großbottlingen	250	30
6	voltwerk electronics	Hamburg	250	100
7	LTi REEnergy	Unna	100	250
8	Oelmaier Technology	Ochsenhausen	100	100
9	PADCON	Helmstadt	50	60
10	Steca Elektronik	Memmingen	40	510
11	Dorfmueller Solaranlagen	Reutlingen	5	5
12	FEG	Sömmerda	<1	12
13	AEG Power Solutions	Warstein-Belecke	n/a	300
14	Aixcon Powersystems	Stolberg	n/a	20
15	Bonfiglio Vectron	Krefeld	n/a	80
16	KOSTAL Industrie Elektrik	Hagen	n/a	190
17	PAIRAN Elektronik	Göttingen	n/a	90
18	REFU Elektronik	Metzingen	n/a	170
19	Sunways	Konstanz	n/a	180
光伏线缆 (PV cables) :				
20	bedea	Aßlar, Herborn		325
21	Draka Industrial Cable	Wuppertal		300
22	HELUKABEL	Windsbach		450
23	HEW-KABEL	Wipperfürth		320
24	HI Kabelkonfektionierung	Beerfelden		120
25	HUBER+SUHNER	Taufkirchen		200
26	KBE Elektrotechnik	Berlin		220
27	Klasing Kabel	Denkendorf		170
28	KWV Kabelwerke VS	Villingen-Schwenningen		90

29	Lumberg Connect	Schalksmühle, Cloppenburg		1000
30	Multi-Contact	Weil am Rhein		120
31	Nexans	Hannover		400
32	PRYSMIAN	Eschweiler, Schwerin,		110
33	Sykonec	Neustadt bei Coburg		42
34	Tyco Electronics	Bensheim		1950
35	U.I. Lapp	Stuttgart		800
36	UK LORT	Ochsenfurt		20
37	VOKA	Plauen, Falkenstein		500
38	XBK-Kabel	Rottweil		200
39	Yamaichi Electronics	Frankfurt(Oder)		70
连接器 (Connectors) :				
40	Amphenol-Tuchel	Heilbronn		350
41	Büschel	Jungingen		30
42	HI Kabelkonfektionierung	Beerfelden		120
43	Hirschmann	Neckartenzlingen, Ettlingen		350
44	Huber+ Suhner	Taufkirchen		200
45	Huonker	Villingen-Schwenningen		100
46	Lumberg Connect	Schalksmühle, Cloppenburg		800
47	Multi-Contact	Weil am Rhein		120
48	U.I.Lapp GmbH	Stuttgart		800
49	Wieland Electric	Bamberg		1000
50	Yamaichi Electronics	Frankfurt(Oder)		70
太阳能接线盒 (Junction boxes) :				
51	Citel	Bochum		130
52	Enwi-Etec	Rogglfing		30
53	Hensel	Lennestadt		800
54	KOSTAL Industrie Elektrik	Freiburg		190
55	Lumberg Connect	Schalksmühle, Cloppenburg		800
56	Multi-Contact	Weil am Rhein		120
57	Phoenix Contact	Blomberg		8400
58	SKS Kontakttechnik	Niederdorf		90
59	Spelsberg	Schalksmühle, Buttstädt		400
60	Tyco Electronics	Bensheim		1950
61	UK LORT	Ochsenfurt		20
62	Weidmüller Interface	Detmold, Wutha-Farnroda, Eisleben		1800
63	Yamaichi Electronics	Frankfurt(Oder)		70

数据来源: BSW

(2)、德国太阳能系统零部件生产制造企业地理分布图



数据来源：BSW

3、德国光伏发电安装和跟踪系统制造企业

(1)、德国光伏发电安装和跟踪系统制造企业情况

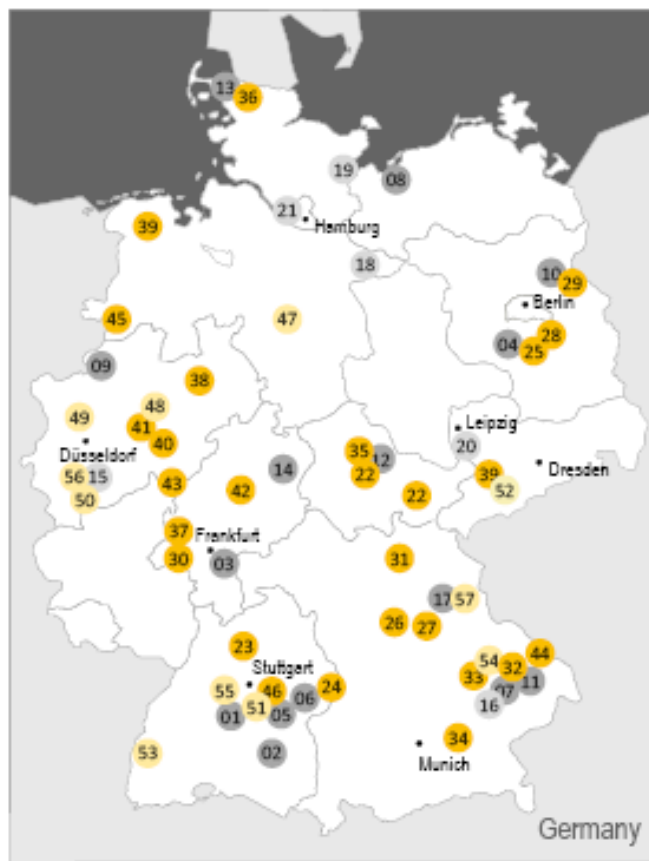
序号	公司名称	地址	员工
跟踪系统-自己制造:			
1	DEGERenergie	Horb	30
2	Eggert	Oberstadion	25
3	EGIS-Equipment-GmbH	Offenbach	5
4	EQ-SYS	Treuenbrietzen	21
5	Galaxy Energy	Heroldstatt	10
6	Green Factory	Heidenheim	12
7	GSM Solar	Mamming	90
8	Hanse Solar	Wismar	10
9	Kemper	Vreden	100
10	mp-tec GmbH& Co. KG	Eberswalde	60

11	PV-Eiwa	Plattling	100
12	Soemtron	Sömmerda	70
13	Solarpark R öden äs	Roden äs	50
14	sonnen_systeme	Alheim-Heinebach	100
跟踪系统—OEM:			
15	Energiebau Solarstromsysteme	K ödn	190
16	IDEEMATEC	Wallerfing	20
17	RWenergy	Schwandorf	30
18	S+S Energietechnik	L üchow-Grabow	5
19	Solar-Trak	L übeck	10
20	Sundustry	Leipzig	5
21	voltwerk electronics	Hamburg	100
安装系统—自己制造:			
22	ALTEC Solartechnik	Crispendorf, S ömmerda	210
23	Benz Alusysteme	Ingersheim	15
24	CEKO	Neresheim	15
25	EQ-SYS	Treuenbrietzen	21
26	Fath Solar	Spalt	100
27	Grammer Solar	Amberg	45
28	Mounting Systems(Conergy)	Rangsdorf	140
29	mp-tec	Eberswalde	60
30	MÜPRO**	Hofheim-Wallau	n/a
31	Niemetz Metall	K önigsfeld	50
32	PV-Eiwa	Plattling	100
33	RegTec	Rottenburg an der Laaber	20
34	Schletter	Kirchdorf	400
35	Soemtron	S ömmerda	70
36	Solarpark R öden äs	Roden äs	50
37	Solarstep	K önigstein	6
38	Soltech**	Bielefeld	15
39	TS-Aluminium	Gro ßefehn, Burgsst ädt	85
40	VM Edelstahltechnik	Plettenberg	20
41	Wagener& Simon	Wuppertal	180
42	Wagner& Co. Solartechnik	C ölbe	400
43	Wilhelm Flender	Netphen	75
44	Zambelli	Grafenau	650
45	Zentralsolar	Rheine	25
46	Zinco	Unterensingen	70
安装系统—OEM			
47	alfasolar	Hannover	40
48	E.u.r.o Tec**	Hagen	30

49	ECOSOLAR	Duisburg	10
50	Energiebau Solarstromsysteme	Köln	230
51	HABDANK PV-Montagesysteme	Göppingen	40
52	Heckert Solar	Chemnitz	240
53	HELTRON**	Breisach	15
54	IDEEMATEC	Wallerfing	20
55	K2 Systems	Weil der Stadt	45
56	Renusol**	Köln	50
57	RWenergy	Schwandorf	30

数据来源：BSW

(2)、德国光伏发电安装和跟踪系统制造企业地理分布图



数据来源：BSW

4、德国太阳能设备生产制造企业

德国在光伏产业领域拥有大量世界领先的制造厂商,因此成为世界上光伏设备制造最大的市场之一,在光伏产业链中的各个阶段都存在着巨大的商机。2008 年,德国太阳能设备制造商累计销售设备 23 亿欧元,2009 年销售额预计达到 20 亿欧元。

(1)、德国太阳能设备生产制造企业情况

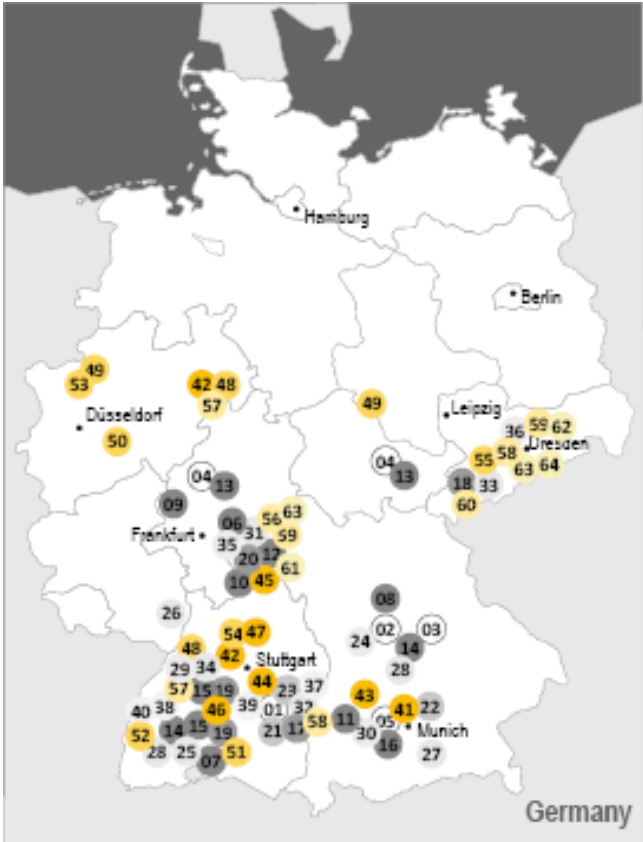
翻译	序号	公司名称	地址	从业人员
硅—设备	1	centrotherm SiTec	Blaubeuren	800
	2	Decker	Berching	50
	3	G+R GreenTech	Regenstauf	170
	4	PVA TePla	Wettenberg, Jena	200
	5	STANGL Semiconductor Equipment	Fürstenfeldbrück	170
硅锭/硅片—设备	6	ALD Vacuum Technologies	Hanau	350
	7	Elma	Singen	190
	8	G&N	Erlangen	40
	9	Herbert Arnold	Weilburg	175
	10	HK Präzisionstechnik	Obernburg	40
	11	KUKA Systems	Augsburg	1200
	12	LOG-O-MATIC	Mainaschaff	20
	13	PVA TePla	Wettenberg, Jena	200
	14	RENA	Gütenbach, Bräunlingen, Berg	950
	15	Schmid	Freudenstadt, Niedereschach	750
	16	STANGL Semiconductor Equipment	Fürstenfeldbrück	170
电池 (Cell) —交钥匙生产线	17	centrotherm photovoltaics	Blaubeuren	800
	18	Roth&Rau	Hohenstein-Ernstthal	790
	19	Schmid	Freudenstadt, Niedereschach	750
	20	SINGULUS TECHNOLOGIES	Kahl	370
电池 (Cell) 热能设备、供热设备	21	centrotherm thermal solutions	Blaubeuren	800
	22	ATV ECHNOLOGIE	Vaterstetten	20
	23	Rehm Thermal Systems	Blaubeuren	170
电池 (Cell) —湿化学	24	Decker	Berching	50
	25	LOTUS Systems	Gutmadingen	110
	26	M-O-T	Speyer	35
	27	Ramgraber	Hofolding b. Brunnthal	45
	28	RENA	Gütenbach, Bräunlingen, Berg	950
	29	Schmid	Freudenstadt	550
	30	STANGL Semiconductor Equipment	Fürstenfeldbrück	170
电池 (Cell)	31	Applied Materials	Alzenau	540

-抗反射涂层	32	centrotherm photovoltaics	Blaubeuren	800
	33	Roth& Rau	Hohenstein-Ernstthal	790
	34	Schmid	Freudenstadt	550
	35	SINGULUS TECHNOLOGIES	Kahl	370
	36	VON ARDENNE Anlagentechnik	Dresden	550
电池 (Cell) -丝网印刷设备	37	ASYS Automatisierungssysteme	Dornstadt	400
	38	JRT Photovoltaics	Teningen	50
	39	Manz Automation	Reutlingen	400
	40	THIEME	Teningen	350
组件 -交钥匙生产线	41	ATS Automation Tooling Systems	Munich	100
	42	Bürkle	Freudenstadt, Rietberg-Mastholte	120
	43	KUKA Systems	Augsburg	1200
	44	MAG	Göppingen	320
	45	REIS ROBOTICS	Obernburg	800
	46	Schmid	Freudenstadt, Niedereschach	750
	47	Teamtechnik	Freiberg am Neckar	350
组件 -串焊机 压膜机	48	Bürkle	Freudenstadt, Rietberg-Mastholte	120
	49	Meier Solar Solar	Bocholt, Roßla	140
	50	Robust	Remscheid	80
	51	Schmid	Niedereschach	200
	52	SOMONT	Umkirch	100
	53	Spaleck/SPALECK-STEVENSON InnoTech	Bocholt	250
	54	Teamtechnik	Freiberg am Neckar	350
	55	USK Karl Utz Sondermaschinen	Limbach-Oberfrohna	230
薄膜 -交钥匙生产线	56	Applied Materials	Alzenau	540
	57	Bürkle	Freudenstadt, Rietberg-Mastholte	120
	58	Centrotherm photovoltaics	Blaubeuren, Dresden	800
	59	LEYBOLD OPTICS	Alzenau, Dresden	380
	60	Roth&Rau	Hohenstein-Ernstthal	790
薄膜 -真空镀膜机	61	Applied Materials	Alzenau	540
	62	FHR Anlagenbau	Ottendorf-Okrilla	170
	63	LEYBOLD OPTICS	Alzenau, Dresden	380

	64	VON ARDENNE Anlagentechnik	Dresden	550
自动化	65	ACI-ecotec	St. Georgen	100
	66	AMB Automation	Langweid	50
	67	ASYS Automatisierungssysteme	Dornstadt	400
	68	ATMsse	Singen	50
	69	ATS Automation Tooling Systems	Munich	100
	70	Baumann	Amberg	210
	71	Grenzebach	Hammlar	1500
	72	IMA Automation Berlin	Berlin	60
	73	Jonas& Redmann Photovoltaics	Berlin	650
	74	JRT Photovoltaics	Teningen	50
	75	KUKA Systems	Augsburg	1200
	76	MAG	Göppingen	320
	77	Manz Automation	Reutlingen	400
	78	Maschinenbau GEROLD	Nettetal	50
	79	MiniTec Maschinenbau	Waldmohr	170
	80	Mondragon Assembly	Stockach	20
	81	Olbricht	Hammlar-Brünen	30
	82	REIS ROBOTICS	Obernburg	800
	83	RENA	Gütenbach, Bräunlingen, Berg	950
	84	Rommel	Ehingen	100
	85	Schiller Automation	Sonnenbühl-Genkingen	290
	86	Schmalz	Glatten	420
	87	Schmid	Niedereschach	200
	88	SLS Solar Line Saxony	Limbach-Oberfrohna	20**
激光加工	89	3D-Micromac	Chemnitz	70
	90	InnoLas	Krailling	80
	91	Jenoptik Automatisierungstechnik	Jena	200
	92	LPKF SolarQuipment	Suhl-Friedberg	50
	93	MAG	Göppingen	320
	94	Manz Automation	Reutlingen	400
	95	Rofin	Starnberg, Hamburg, Günding	1600
	96	Schmid	Schwetzingen	60

数据来源: ea-pvps

(2)、德国太阳能设备生产制造企业地理分布图



数据来源：BSW

5、德国光伏产业 R&D 机构

(1)、德国光伏产业 R&D 机构信息

R&D 领域		组织机构	专长	地址
硅料（Si feedstock）	1	CSP - Fraunhofer Center for Silicon Photovoltaics	结晶与材料分析	Halle
	2	IISB - Fraunhofer Institute of Integrated Systems and Device Technology, Crystal Growth Laboratory (CGL)	结晶与材料分析	Erlangen
	3	IKZ -Institute of Crystal Growth	结晶与材料分析	Berlin
	4	Institute of Experimental Physics, Freiberg University of Mining and Technology	c-Si 原料, characterization	Freiberg
	5	ISC Konstanz - International Solar Energy Research Center	c-Si 原料, characterization	Konstanz

	6	THM - Fraunhofer Technology Center for Semiconductor Materials	c-Si 原料, characterization, III-V-Semiconductors	Freiburg
基于电池技术的硅片研究	7	Department on Physics, Section Photovoltaics, University of Konstanz	高效率电池(背电极接触和双面电池)	Konstanz
	8	ISC Konstanz - International Solar Energy Research Center	高效率电池, characterization	Konstanz
	9	ISE - Fraunhofer Institute for Solar Energy Systems	高效率电池, characterization	Freiburg
	10	ISFH -Institute for Solar Energy Research	高效率电池(背电极接触和双面电池)	Hameln
	11	ZAE - Bavarian Center for Applied Energy Research	高效率 and 薄电池	Erlangen
薄膜技术	12	CeNIDE - Center for Nanointegration, University of Duisburg-Essen	III-V und II-VI 纳米线	Duisburg, Essen
	13	CISLAB - Institute of Solid-State Physics, University of Jena	CIS/CIGS, CdTe, 硅&CIGS 异质结构	Jena
	14	CSP - Fraunhofer Center for Silicon Photovoltaics	c-Si	Halle
	15	Department for Experimental Physics, Technical University of Ilmenau	III-V	Ilmenau
	16	Department for Material Sciences, University of Technology Darmstadt	CIS/CIGS, CdTe	Darmstadt
	17	HZB - Helmholtz Center for Materials and Energy	a-Si/ μ -Si, CIS/CIGS, III-V, a-Si/C-Si heterojunction,	Berlin
	18	Institute for Experimental Physics, Freiberg University of Mining and Technology	CIS/CIGS	Freiberg
	19	Institute of Physics, Justus-Liebig University of Gießen	CIS/CIGS, ZnTe	Gießen
	20	Institute of Physics, University of Oldenburg	CIS/CIGS	Oldenburg
	21	IPE -Institute of Physical Electronics, University of Stuttgart	CIS/CIGS, a-Si/C-Si heterojunction	Stuttgart
	22	IPHT -Institute of Photonic Technology	c-Si	Jena

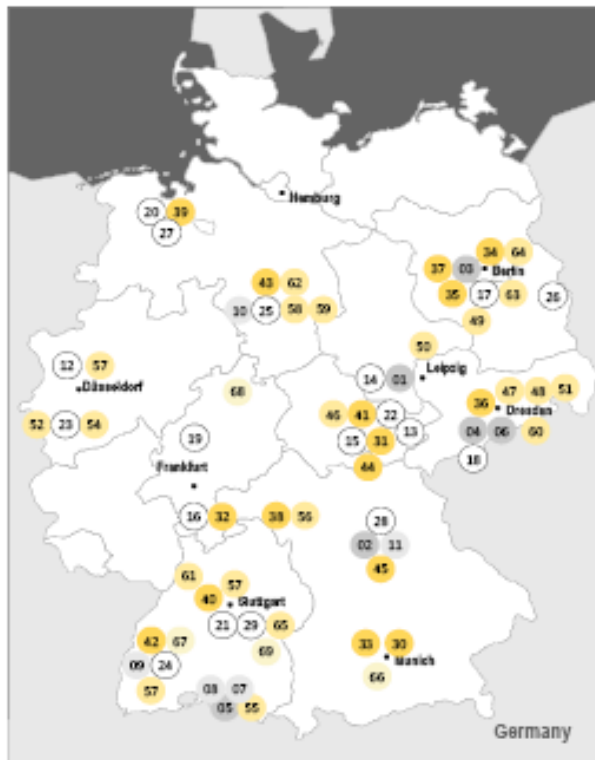
	23	IPV -Institute of Photovoltaics, Research Centre Jülich	a-Si/ μ -Si, CIS/CIGS, CdTe	Jülich
	24	ISE - Fraunhofer Institute for Solar Energy Systems	c-Si, III-V	Freiburg
	25	ISFH -Institute for Solar Energy Research	c-Si	Hameln
	26	IST Frankfurt - Institute for Solar Technologies	CIS/CIGS on flexible substrates	Frankfurt (Oder)
	27	Next Energy - EWE Research Centre for Energy Technology, University of Oldenburg	a-Si/ μ -Si	Oldenburg
	28	ZAE - Bavarian Center for Applied Energy Research	c-Si	Erlangen
	29	ZSW - Centre for Solar Energy and Hydrogen Research Baden-Württemberg	CIS/CIGS	Stuttgart, Widderstall
有机电池技术	30	CeNS -Center for NanoScience, Ludwig-Maximilians-University Munich	染料敏化, 聚合物, 复合材料	Munich
	31	Department for Experimental Physics, University of Technology Ilmenau	聚合物	Ilmenau
	32	Department for Material Sciences, University of Technology Darmstadt	分子, 复合材料	Darmstadt
	33	Department of Physics, University of Technology Munich	聚合物, 复合材料	Munich
	34	HZB - Helmholtz Center for Materials and Energy	染料敏化, 聚合物, 分子, 复合材料	Berlin
	35	IAP - Fraunhofer Institute for Applied Polymer Research	聚合物, 分子, 复合材料	Potsdam
	36	IAPP -Institute for Applied Photo Physics, University of Technology Dresden	分子	Dresden
	37	Institute for Physics and Astronomy, University of Potsdam	聚合物, 分子, 复合材料	Potsdam
	38	Institute of Experimental Physics VI, University of Würzburg	聚合物, 分子, 复合材料	Würzburg
	39	Institute of Physics, University of Oldenburg	聚合物, 分子, 复合材料	Oldenburg

	40	IPE -Institute of Physical Electronics, University of Stuttgart	染料敏化	Stuttgart
	41	IPHT -Institute of Photonic Technology	聚合物, 复合材料	Jena
	42	ISE - Fraunhofer Institute for Solar Energy Systems	染料敏化, 聚合物, 分子, 复合材料	Freiburg
	43	PCI -Institute of Physical Chemistry and Electrochemistry, University of Hannover	染料敏化	Hannover
	44	TITK - Thuringian Institute of Textile and Plastics Research	聚合物, 复合材料	Rudolstadt
	45	ZAE - Bavarian Center for Applied Energy Research	聚合物, 分子, 复合材料	Erlangen
工艺和生 产技术	46	CIS -Institute for Microsensorics, SolarCentre	高效超薄晶体电池工艺及设备发展, 在线工艺检验	Erfurt
	47	COMEDD - Center for Organic Materials and Electronic Devices at Fraunhofer Institute for Photonic Microsystems (IPMS)	Vacuumdeposition, substrate fabrication and encapsulation of organic materials, roll-to-roll prototype line for flexible substrates	Dresden
	48	FEP - Fraunhofer Institute for Electron Beam and Plasma Technology	Electron beam, pulsed magnetron sputtering and plasma deposition	Dresden
	49	HZB - Helmholtz Center for Materials and Energy	Process control and doping, quality assurance and diagnosis	Berlin
	50	IKTR -Institute for Plastics Technologies and Recycling	封装技术	Wei ßandt-G ötzau
	51	IKTS - Fraunhofer Institute for Ceramic Technologies and Systems	Screen printing, PECVD, nano-inks, characterization	Dresden
	52	ILT - Fraunhofer Institute for Laser Technology	激光束焊接	Aachen
	53	IPA - Fraunhofer Institute for Production Technology and Automation	Production and process automation, coating and plating	Stuttgart
	54	IPV -Institute of Photovoltaics, Research Centre Jülich	Plasma CVD, sputter deposition, test module development	Jülich
	55	ISC Konstanz - International Solar Energy Research Center	Process and equipment development for crystalline cells, cell characterisation and simulation, module development	Konstanz

	56	ISC Würzburg - Fraunhofer Institute for Silicate Research	Thin film encapsulation, anti-reflex coating of solar glass	Würzburg
	57	ISE - Fraunhofer Institute for Solar Energy Systems	Inline processes for crystalline cells, durability and characterization, special evaluation and center for Si wafer/cell technology PV-TEC	Freiburg, Gelsenkirchen
	58	ISFH -Institute for Solar Energy Research	激光,喷墨和涂覆工艺,表面钝化,导电胶	Hameln
	59	IST Braunschweig - Fraunhofer Institute for Surface Engineering and Thin Films	低压常压加工,涂层系统(TCO),薄膜特征,表面分析	Braunschweig
	60	IWS - Fraunhofer Institute for Material and Beam Technology	常压等离子加工	Dresden
	61	KIT - Karlsruhe Institute of Technology	聚合物电池生产工艺 (卷对卷(roll-to-roll)制程生产, 干燥)	Karlsruhe
	62	LZH - Laser Zentrum Hannover	激光加工	Hannover
	63	PI Berlin - Photovoltaic Institute	封装(薄膜), 电池焊接、组件测试	Berlin
	64	PVcomB - PV Competence Center Berlin	薄膜生产(硅和 CIS),运营两条相关生产线	Berlin
系统	65	ZSW - Centre for Solar Energy and Hydrogen Research Baden-Württemberg	In-line sputtering systems, evaporation and plasma CVD, pilot production line for CIS modules, film analysis, testing	Stuttgart, Widderstall
	66	Chair for Thermodynamics, University of Technology Munich	跟踪, BIPV	Munich
	67	ISE - Fraunhofer Institute for Solar Energy Systems	高集成光伏系统 (带 III-V 电池)	Freiburg
	68	IWES -Institut für Solare Energieversorgungstechnik	工程与系统优化	Kassel
	69	ZSW - Center for Solar Energy and Hydrogen Research Baden-Württemberg	跟踪和集成系统	Stuttgart, Widderstall

数据来源: iea-pvps

(2)、德国光伏产业 R&D 机构地理分布



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