»Room for growth«

Text: Garrett Hering

Concentrating solar thermal power gains steam in Spain, as momentum builds for major projects in the US, North Africa, the Middle East, Asia and Australia

Highlights

- Awakened CSP industry adds 275 MW of new generating capacity in 2009 and is on track to bring more than 600 MW on line in 2010 – mostly in Spain
- Facing a 15 GW interconnection queue, the Spanish Ministry of Industry approves 2.4 GW of CSP projects through 2013 under »old« feed-in tariff – but incentive uncertainty remains for the rest
- There are about 50 projects at various stages of construction in Spain, North Africa and the US
- US Department of Interior targets groundbreaking for up to 4.5 GW of CSP by the end of 2010

The solar photovoltaic industry knows Miguel Sebastian Gascon as the man who pulled the plug on the world's largest PV market in 2008. As Spain's Minister of Industry, Tourism and Commerce, and an influential economic advisor to Prime Minister Jose Luis Zapatero, Minister Sebastian's proposal resulted in a 500 MW annual cap on incentives for PV in 2009 – a year after Spain led the world by installing 2,748 MW, according to government records.

Aimed at reining in the exploding cost of Spain's generous PV feed-in tariffs just as the country was heading into a hard recession, the effect on the domestic PV industry has been disastrous, with the sector shedding as many as 20,000 jobs in the past year, a mere 5 MW installed in 2009 by August and major market participants still reeling (see PI 11/2009, p. 36).

The concentrating solar thermal power (CSP) sector, on the other hand, is voicing content with Minister Sebastian's nearly identical proposal to cap CSP projects qualifying for incentive payments to approximately 500 MW per year over the next 4 years, which Spain's Council of Ministers approved on Nov. 13.

»In principle, we are pleased with the decision,« Luis Crespo, the head of Spanish solar thermal electric trade association Protermosolar, told PHOTON International, adding, »A

Abengoa Solar S.A. (2)

▲ Majestic: Spain's King Juan Carlos (fifth from left) and Queen Sofia (fourth from left) joined Spanish government and Abengoa representatives in September at the inauguration ceremony for a 20 MW power tower – the world's largest to date.

◀ CSP showcase: Abengoa's Solucar Platform near Seville, Spain, features two generations of solar tower technology as well as parabolic troughs, concentrating PV and conventional crystalline PV. CSP represents most of the 300 MW of capacity scheduled to come on line at the site by 2013.

couple of weeks before the decision it looked like the number of megawatts would be much reduced, so we are really happy with the current situation.«

The decision to limit the CSP market to 500 MW per year over the next several years comes at an earlier phase of market penetration than when the ministry slashed incentives for PV a little over a year ago. Spain's solar thermal electric market has only awoken gradually over the past 3 years, adding approximately 11 MW in 2007, 50 MW in 2008 and an estimated 270 MW in 2009. Another 500 MW in 2010 would still mean 85-percent annual growth before the planned domestic market stagnation hits in 2011. By then, project developers, technology suppliers and CSP investors hope other markets come alive – primarily the southwestern US, but also Africa, Asia and the Middle East.

In total, the Nov. 13 decision allows for interconnection of about 2.4 GW of CSP plants to the Spanish grid by the end of 2013. The output from these approximately 50 approved plants – almost all using parabolic trough technology – will be paid under Royal Decree 661 from 2007, which fixed payments for solar thermal electric generation at 26.9 o cents (39.6¢) per kWh over 25 years for plants up to a maximum rated capacity of 50 MW. The law originally included a 2010 target of 500 MW. The new grid-connection schedule accelerates that target to 831 MW in response to the strong demand for incentives and the industry's increasing maturity.

Although the industry is happy to have market certainty in the near term, there are still several unresolved issues, according to Crespo. About twice as many projects had applied for registration under the »old« feed-in tariff than were approved – about 100 projects in total accounting for 4.5 GW of generating capacity. »We know there are perhaps some projects that have the right to be registered,« says Crespo, who believes »a couple more projects are likely to be included« under the 661/2007 policy conditions.

»We are satisfied with the volume of plants scheduled for the next 4 years, but we also need to have some additional incentives and promotional capacity to develop innovative concepts,« adds the Spanish industry association's general secretary, explaining, »Those plants were designed a couple of years ago and only provide volume to the sector – not innovation and cost reduction.«

»This sector is alive«

Moreover, the CSP pipeline in Spain far exceeds the capacity of projects approved through 2013. About 15 GW of projects have applied for grid connection. But currently there is no policy for the post-2013 period and nobody knows when the new decree will be published – although the industry hopes to see at least a new draft in 2010. So what happens next? »There is a lot of work to be done,« says Crespo. »This sector is alive. Spanish companies will be busy building in Spain and will also focus on project development in international markets. There is room for growth.«

One of the companies at the forefront of the CSP building boom is Abengoa Solar, the subsidiary of publicly traded engineering firm Abengoa SA. The company this September completed its PS20, the largest commercial solar tower plant in the world at 20 MW, in Sanlucar la Mayor, just outside Seville. The area also holds about 3 MW of crystalline and concentrating PV, an 11 MW power tower completed in 2007, and Solnova I, a 50 MW parabolic trough plant scheduled to go on line in December. Two more fully financed 50 MW trough facilities are under construction and scheduled to come on line in 2010. Additionally,

Rolf Schulten / photon-pictures.com

◀ Scaling up: eSolar completed its 5 MW Sierra Generating Station this year in Lancaster, California. Using the technology, developer NRG Energy plans to develop around 1.5 GW of projects in the US Southwest and India over the next decade.

▶ Spain's market is poised for strong growth in 2009 and 2010, but the government's Nov. 13 decision essentially calls for stagnation from 2011 to 2013. The plants shown on this map represent most of the 2.4 GW of capacity approved for incentives, while about 15 GW have applied for interconnection.

CSP plants operating and under construction in Spain

ID#	Plant	Power	Location	Project developer	Technology	Status
1	Andasol 1	50 MW	Granada	ACS Cobra, Solar Millennium	Parabolic trough*1	Operating since 2008
2	Andasol 2	50 MW	Granada	ACS Cobra, Solar Millennium	Parabolic trough*1	Operating since 2009
3	Andasol 3	50 MW	Granada	MAN Solar Millennium	Parabolic trough*1	Under construction
4	Andasol 4	50 MW	Granada	ACS Cobra, Solar Millennium	Parabolic trough*1	Under construction
5	Alvarado	50 MW	Badajoz	Acciona Energia	Parabolic trough	Operating since 2009
6	Aste 1a	50 MW	Ciudad Real	Aries Ingenieria y Sistemas	Parabolic trough	Under construction
7	Aste 1b	50 MW	Ciudad Real	Aries Ingenieria y Sistemas	Parabolic trough	Under construction
8	Astexol	50 MW	Badajoz	Aries Ingenieria y Sistemas	Parabolic trough	Under construction
9	Arcosol 50 (Valle 1)	50 MW	Cadiz	Torresol Energy	Parabolic trough	Under construction
10	Arenales PS	50 MW	Seville	Ibereolica Solar, Fotowatio	Parabolic trough	Under construction
11	Aznalcollar TH	50 MW	Seville	Abengoa Solar	Stirling dish	Under construction
12	Badajoz 2	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
13	El Reboso 1	50 MW	Seville	Bogaris	Parabolic trough	Under construction
14	ESI	0.01 MW	Seville	ESI, Schlaich Bergermann	Stirling dish	Operating since 2004
15	Extresol 1	50 MW	Badajoz	ACS Cobra Group	Parabolic trough*1	Under construction
16	Extresol 2	50 MW	Badajoz	ACS Cobra Group	Parabolic trough*1	Under construction
17	Extresol 3	50 MW	Badajoz	ACS Cobra Group	Parabolic trough*1	Under construction
18	Gemasolar	17 MW	Seville	Torresol Energy	Power tower*2	Under construction
19	Helios 1	50 MW	Ciudad Real	Helios 1 Hyperion Energy	Parabolic trough	Under construction
20	Helios 2	50 MW	Ciudad Real	Helios 2 Hyperion Energy	Parabolic trough	Under construction
21	La Dehesa	50 MW	Badajoz	Renovables SAMCA	Parabolic trough*1	Under construction
22	La Florida	50 MW	Badajoz	Renovables SAMCA	Parabolic trough*1	Under construction
23	La Puebla 2	50 MW	Seville	Bogaris	Parabolic trough	Under construction
24	Lebrija	50 MW	Seville	Solucia Renovables, Solel Solar	Parabolic trough	Under construction
25	Majadas	50 MW	Caceres	Acciona Energia	Parabolic trough	Under construction
26	Manchasol 1	50 MW	Ciudad Real	ACS Cobra Group	Parabolic trough*1	Under construction
27	Manchasol 2	50 MW	Ciudad Real	ACS Cobra Group	Parabolic trough*1	Under construction
28	Medellin	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
29	Olivenza 1	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
30	Palma del Rio 1	50 MW	Cordoba	Acciona Energia	Parabolic trough	Under construction
31	Palma del Rio 2	50 MW	Cordoba	Acciona Energia	Parabolic trough	Under construction
32	PE 1	1.4 MW	Murcia	Novatec Solar	Fresnel lens	Operating since 2008
33	Planta Solar 10	11 MW	Seville	Abengoa Solar	Power tower*3	Operating since 2008
34	Planta Solar 20	20 MW	Seville	Abengoa Solar	Power tower*3	Operating since 2009
35	Puertollano	50 MW	Puertollano	Iberdrola Renovables	Parabolic trough	Operating since 2009
36	Renovalia	1 MW	Albacete	Renovalia	Stirling dish	Under construction
37	Santa Amalia	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
38	Serrezuela Solar 2	50 MW	Badajoz	Serrezuela Solar	Parabolic trough	Under construction
39	Solaben 2	50 MW	Caceres	Abengoa Solar	Parabolic trough	Under construction
40	Solaben 3	50 MW	Caceres	Abengoa Solar	Parabolic trough	Under construction
41	Solnova 1	50 MW	Seville	Abengoa Solar	Parabolic trough	Under construction
42	Solnova 3	50 MW	Seville	Abengoa Solar	Parabolic trough	Under construction
43	Solnova 4	50 MW	Seville	Abengoa Solar	Parabolic trough	Under construction
44	Termosol 1	50 MW	Badajoz	FPL Energy	Parabolic trough	Under construction
45	Termosol 2	50 MW	Badajoz	FPL Energy	Parabolic trough	Under construction
46	Termosolar Borges	25 MW	Lerida	Termosolar Borges	Parabolic trough	Under construction
47	Torrefresneda	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
48	Valdetorres	50 MW	Badajoz	Ibereolica Solar	Parabolic trough	Under construction
49	Vallesol 50 (Valle 2)	50 MW	Cadiz	Torresol Energy	Parabolic trough*1	Under construction

*1 with molten-salt storage, *2 with salt storage, *3 with 1-hour storage

Solar Millennium AG

Abengoa is planning another 20 MW power tower, two more 50 MW trough plants and 80 MW of Stirling dish technology at the Sanlucar la Mayor site. At least 300 MW is scheduled for completion by the end of 2013.

Across the Mediterranean Sea, Abengoa has two integrated solar combined cycle (ISCC) – hybrid natural gas/parabolic trough plants – under construction in Algeria and Morocco. The plants each incorporate about 20 MW of solar generating capacity into larger natural gas facilities. Abengoa is also in negotiations with the Abu Dhabi Future Energy Company (Masdar) to construct a 100 MW CSP plant in the United Arab Emirates by 2011.

Not surprisingly, Abengoa's CSP activities jump-started its solar sales with triple-digit growth in the first 9 months of 2009, the company reported in November, with revenues increasing 143 percent to €71 million ($104.4 million) and pre-tax earnings up 222 percent to €12 ($17.7 million). Given its 2010 pipeline, the division should see triple-digit growth again next year.

Erlangen, Germany-based Solar Millennium AG, the only publicly traded pure CSP company, so far has completed two 50 MW parabolic trough plants in Andalusia, Spain, each with 7.5 hours of molten-salt storage. According to preliminary figures, Solar Millennium increased sales by 528 percent to €201 million ($295.7 million) in its 2008/2009 fiscal year, which ended in late October, while nearly quadrupling operating earnings to €43 million ($63.3 million).

Like Abengoa, Solar Millennium is already active in North Africa, where the company is currently building an ISCC plant in Egypt. Several other CSP plants are in the near-term pipeline for the Middle East and North Africa, including another hybrid facility in the planning stages in Iran and 100 MW parabolic trough plants in Jordan and Israel. But these projects only scratch the surface of what may eventually become one of the world's biggest CSP markets. The Desertec Industrial Initiative GmbH – a major European initiative for solar thermal development – officially incorporated on Oct. 30. The group, made up of 12 founding members – including large financial institutions and solar thermal power plant and component suppliers – has the goal of procuring as much as 15 percent of Europe's power by 2050 mostly from large-scale CSP plants in the Middle East and North Africa.

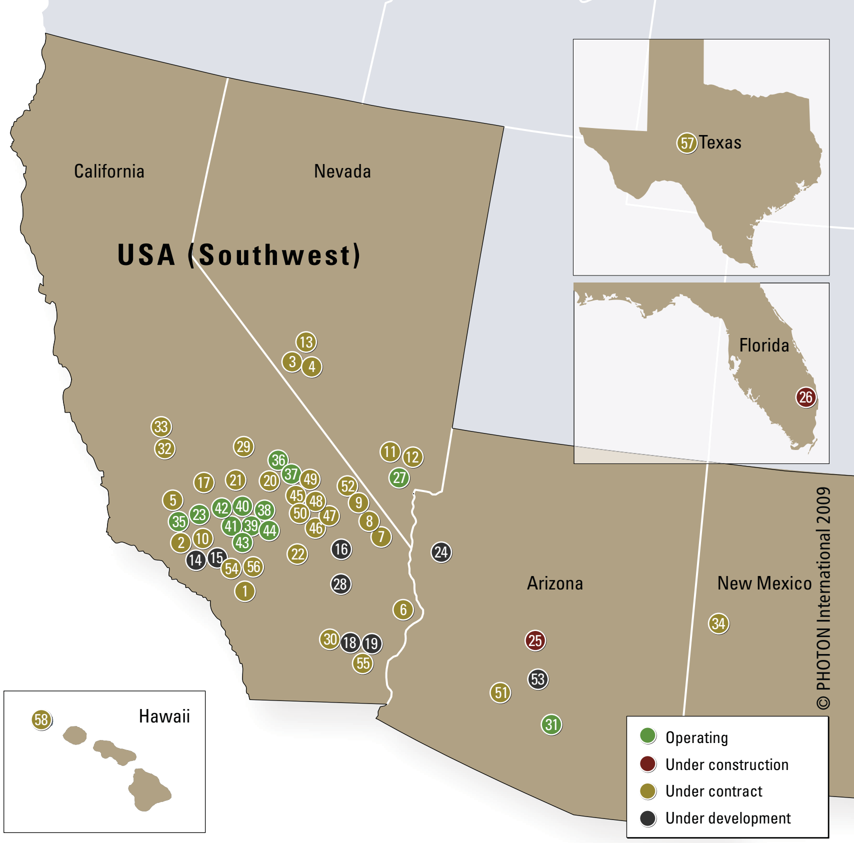
Asia also has attractive resources for solar thermal electricity – and several markets are showing a pulse. Through September, about 1,100 MW of CSP plants were proposed in China in 2009, according to Zhifeng Wang, director of the country's National Basic Research Program. At the International Energy Agency's SolarPACES conference in Berlin in September, Wang estimated that as much as 300 MW could be completed by 2015. India, which is revamping its solar policies (see article p. 24), has also

CSP plants operating, under construction and under development in the US

ID#	Plant	Power	Location	Project developer	Technology	Status
1	Abengoa Mojave Solar Project	250 MW	San Bernardino County, CA	Abengoa Solar	Parabolic trough	Under contract
2	Alpine SunTower	92 MW	Antelope Valley, CA	NRG Energy, eSolar	Power tower	Under contract
3	Amargosa Farm Rd. I	242 MW	Nye County, NV	SolarMillennium	Parabolic trough	Under contract
4	Amargosa Farm Rd. II	242 MW	Nye County, NV	SolarMillennium	Parabolic trough	Under contract
5	Beacon Solar Energy Project	250 MW	Kern County, CA	NextEra, FPL Energy	Parabolic trough	Under contract
6	Blythe Solar Power Project	968 MW	Blythe, CA	SolarMillennium, Chevron	Parabolic trough	Under contract
7	BrightSource PPA5	200 MW	Mojave Desert, CA	BrightSource Energy	Power tower	Under contract
8	BrightSource PPA6	200 MW	Mojave Desert, CA	BrightSource Energy	Power tower	Under contract
9	BrightSource PPA7	200 MW	Mojave Desert, CA	BrightSource Energy	Power tower	Under contract
10	City of Palmdale	62 MW	Palmdale, CA	Inland Energy	Parabolic trough	Under contract
11	Coyote Springs I	200 MW	Coyote Springs, NV	BrightSource Energy	Power tower	Under contract
12	Coyote Springs II	200 MW	Coyote Springs, NV	BrightSource Energy	Power tower	Under contract
13	Crescent Dunes	180 MW	Crescent Dunes, NV	SolarReserve	Power tower	Under contract
14	eSolar I	84 MW	Los Angeles County, CA	NRG Energy, eSolar	Power tower	Under development

◀ Storing the sun: Solar Millennium AG's Andasol 1 and 2 projects in Andalusia, Spain, have a generating capacity of 50 MW each and include 7.5 hours of molten-salt storage.

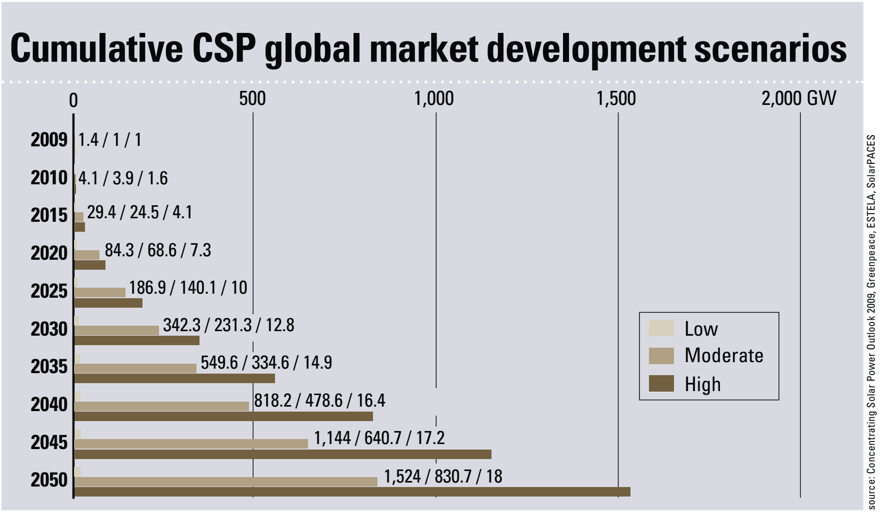
▶ The near- to medium-term CSP pipeline in the US is over 10 GW, most of which is under contract with Southwest utilities. The US government hopes to assist as much as 4.5 GW to break ground by the end of next year.



CSP plants operating, under construction and under development in the US

ID#	Plant	Power	Location	Project developer	Technology	Status
15	eSolar II	66 MW	Los Angeles County, CA	NRG Energy, eSolar	Power tower	Under development
16	Fort Irwin Solar Project	500 MW	Fort Irwin, CA	Acciona Energia	–	Under development
17	Gaskell SunTower	245 MW	Kern County, CA	NRG Energy, eSolar	Power tower	Under contract
18	Genesis Solar I	125 MW	Riverside County, CA	NextEra, FPL Energy	Parabolic trough	Under development
19	Genesis Solar II	125 MW	Riverside County, CA	NextEra, FPL Energy	Parabolic trough	Under development
20	Ivanpah SEGS I	110 MW	Barstow, CA	BrightSource Energy	Power tower	Under contract
21	Ivanpah SEGS II	110 MW	Barstow, CA	BrightSource Energy	Power tower	Under contract
22	Ivanpah SEGS III	220 MW	Barstow, CA	BrightSource Energy	Power tower	Under contract
23	Kimberlina Solar Thermal Power Plant	5 MW	Bakersfield, CA	Ausra	Linear fresnel reflector	Operating since 2008
24	Kingman Solar Project	200 MW	Kingman, AZ	Albiasa	Parabolic trough	Under development
25	Maricopa Solar	1.5 MW	Peoria, AZ	Tessera Solar	Stirling dish	Under construction
26	Martin Next Generation Solar Energy Center	75 MW	Indiantown, FL	FPL Energy	Parabolic trough	Under construction
27	Nevada Solar One	64 MW	Boulder, NV	Acciona Energia	Parabolic trough	Operating since 2007
28	Palen Solar Power Project	484 MW	Desert Center, CA	SolarMillennium, Chevron	Parabolic trough	Under development
29	Ridgecrest Solar Power Project	250 MW	Ridgecrest, CA	SolarMillennium	Parabolic trough	Under contract
30	Rice Solar Energy Project	150 MW	Riverside County, CA	SolarReserve	Power tower	Under contract
31	Saguaro Power Plant	1 MW	Red Rock, Arizona	Arizona Public Service	Parabolic trough	Operating since 2006
32	San Joaquin Solar I	53 MW	Coalinga, CA	San Joaquin Solar	Parabolic trough	Under contract
33	San Joaquin Solar II	53 MW	Coalinga, CA	San Joaquin Solar	Parabolic trough	Under contract
34	Santa Teresa New Mexico SunTower	92 MW	Santa Teresa, NM	NRG Energy, eSolar	Power tower	Under contract
35	Sierra SunTower	5 MW	Antelope Valley, CA	ESolar	Power tower	Operating since 2009
36	Solar Electric Generating Station I	13.8 MW	Daggett, CA	Luz International	Parabolic trough	Operating since 1984
37	Solar Electric Generating Station II	30 MW	Daggett, CA	Luz International	Parabolic trough	Operating since 1985
38	Solar Electric Generating Station III	30 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1985
39	Solar Electric Generating Station IV	30 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1989
40	Solar Electric Generating Station V	30 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1989
41	Solar Electric Generating Station VI	30 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1989
42	Solar Electric Generating Station VII	30 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1989
43	Solar Electric Generating Station VIII	80 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1989
44	Solar Electric Generating Station IX	80 MW	Kramer Junction, CA	Luz International	Parabolic trough	Operating since 1990
45	Solar Partners XVI	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
46	Solar Partners XVII	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
47	Solar Partners XVIII	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
48	Solar Partners XIX	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
49	Solar Partners XX	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
50	Solar Partners XXI	200 MW	San Bernardino County, CA	BrightSource Energy	Power tower	Under contract
51	Solana Generating Station*[1]	280 MW	Gila Bend, AZ	Abengoa Solar	Parabolic trough	Under contract
52	Solel Mojave Solar Plant I	554 MW	Mojave Desert, CA	Solel Solar Systems	Parabolic trough	Under contract
53	Sonoran Solar Project	375 MW	Maricipa County, AZ	NextEra, FPL Energy	Parabolic trough	Under development
54	Stirling Solar One	850 MW	Victorville, CA	Tessera Solar	Stirling dish	Under contract
55	Stirling Solar Two	750 MW	Imperial Valley, CA	Tessera Solar	Stirling dish	Under contract
56	Victorville Hybrid Gas-Solar plant	50 MW	Victorville, CA	Inland Energy	Parabolic trough	Under contract
57	Western Ranch Solar	27 MW	San Antonio, TX	Tessera Solar	Stirling dish	Under contract
58	Westside Solar Project	10 MW	Kauai, HI	Pacific Light & Power	Parabolic trough	Under contract

*[1] with 6 hours of storage



◀ A study by Greenpeace International, the European Solar Thermal Electric Association and SolarPACES presented three market development scenarios. Even the »moderate« scenario sees annual additions of 12.6 GW and investments of €40 billion ($58.8 billion) by 2020 – but favorable public policies are required.

attracted much interest. For example, India's Acme Group this year inked a licensing agreement with California-based power tower technology developer eSolar to build up to 1 GW in India over the next 10 years.

The Australian government, which this year announced approximately $1.2 billion to support the construction of utility-scale solar PV and CSP facilities, plans to select suppliers as early as next year to participate in its so-called Solar Flagships program. The utility-scale solar program is to consist of two large solar thermal and two large photovoltaic plants with a combined generating capacity of 1 GW. Construction is planned to begin in 2012.

Back to where it all began

However, the market with the greatest potential to compliment Spain's rejuvenation of the CSP sector is the US – primarily, but not exclusively, the Southwest. European developers such as Abengoa, Acciona Energia and Solar Millennium, as well as BrightSource Energy of Israel, and US companies NRG Energy, NextEra Energy, SolarReserve and Tessera Solar have built a near-term development pipeline of over 10 GW – most of which is under 20- to 25-year contracts signed over the past 2 years with utilities in the southwestern US, priced between 12¢ and 16¢ per kWh, and scheduled to break ground in the next 2 years (see map/table, p. 51).

Until a few years ago, there had been no new CSP development in the US since Israel's Luz International constructed 354 MW of parabolic trough plants in the California Mojave Desert between 1984 and 1990. In late 2007, Spanish company Acciona revived the market by completing its 64 MW Nevada Solar One plant (see PI 11/2007, p. 136). After a quiet 2008, the US market picked up again in 2009. One commercial plant is under construction in Florida that will integrate 85 MW of parabolic trough capacity into a combined cycle natural gas plant operated by utility Florida Power and Light (FPL).

Moreover, several large-scale pilot plants were either completed in 2009 or under construction at the end of the year. These included innovative technology deployments of Stirling dish systems and power towers, such as a 5 MW eSolar plant completed in Lancaster, California, northeast of Los Angeles. The company has an agreement with New Jersey-based project developer NRG Energy Inc. to develop up to 500 MW in the US. NRG has power purchase agreements (PPAs) for the output from two 92 MW plants with El Paso Electric in Texas and Pacific Gas & Electric (PG&E) in California that are scheduled to break ground as early as 2010 and begin delivering electricity in 2011 and 2012, respectively.

Houston, Texas-based Tessera Solar is currently constructing its first solar farm in Peoria, Arizona, for utility Salt River Project, which features 60 dish systems designed by Stirling Energy Systems (SES). The 1.5 MW project is scheduled for completion early next year. By the end of 2010, Tessera plans to break ground on two mammoth projects – both in California – with a combined capacity of about 1.6 GW.

These are two of the 13 utility-scale CSP and PV projects – including 4.5 GW of solar thermal and 717 MW of PV – that the US Department of the Interior has placed on a »fast-track« list to break ground by the end of 2010 in order to qualify for economic stimulus under the American Recovery and Reinvestment Act of 2009 (see PI 11/2009, p. 12). Other developers on the »fast track« list planning to break ground in 2010 include power tower developers Solar Reserve and BrightSource, which this year broke ground on a 29 MW pilot plant being used by Chevron Corp. to deliver steam for enhanced oil recovery in Coalinga, California. Abengoa, Solar Millennium and NextEra Energy Resources, a subsidiary of FPL, each plan to break ground on several hundred megawatts of large-scale parabolic trough plants in California and Arizona by December 2010.

But in order for that to happen, they need funding from the Recovery Act, which created about $15 billion in incentives for solar projects, including loan guarantees from the Department of Energy and cash grants from the Treasury Department equal to 30 percent of capital costs. Given a cumbersome land-use and permitting process, breaking ground on 4.5 GW of CSP in the US next year will not be easy.

»The final green light will be obtaining financing from the DOE loan program,« admitted Amando Sanchez Falcon, Abengoa's finance director, during a conference call with media and analysts on Nov. 4. Nevertheless, most analysts agree that the US CSP market could equal Spain's in the near term, and has the potential to dwarf it in the long run.

24 GW by 2020 – »realistic«

How big could the global market really be in the next decade? A new report by CSP Today estimates that 24 GW of solar thermal electric capacity will be on line by 2020. »I am convinced that these 24 GW can be easily achieved,« says Protermosolar's Crespo. »It's not an optimistic scenario. It's a realistic scenario.« On the optimistic side, a recent report by Greenpeace International, the European Solar Thermal Electric Association and SolarPACES sees up to 14.7 GW deployed annually by 2020 and 84 GW of cumulative installed CSP capacity by that time.

Nikolaus Benz, managing director of Schott Solar CSP GmbH, the largest manufacturer of receiver tubes for parabolic trough plants, prefers reality. »This looks like a success story. But along with the financial and economic crisis, some nasty clouds are darkening the bright CSP sky,« warned Benz in September at the SolarPACES conference in Berlin, Germany. »Financing has become more difficult. There is big uncertainty in the US and Spain. And the overcapacity in PV and the vast improvement in the sector has created a new threat: large-scale thin-film PV at low cost.«

In addition, based on reduced PV prices over the past year and the ongoing challenges of building new long-line transmission, state energy regulators in at least one key CSP market – California – are considering the benefits of leaning more heavily on distributed PV resources closer to demand than on large-scale solar thermal and wind resources in remote areas (see article p. 12).

But with policy uncertainty now eliminated in Spain at least for near-term projects, the US government backing a revival in the Southwest, and additional markets emerging in Asia, Australia, North Africa and the Middle East, there may be room for both PV and CSP to grow – although there will most certainly be competition. ●