CLSA

Solar

Sector outlook

Charles Yonts
charles.yonts@clsa.com
+852 2600 8539

Johnny Lau
+852 2600 8175

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China
Power

The 10th man on Hanergy

What if when everybody agrees, we're all wrong?

Aspiring thin-film solar equipment maker Hanergy has shrugged off media enquiries into shadow banking and questionable contracts with the parent company to attain a market cap greater than CGN, Huaneng, Great Wall or Lenovo. We've gotten no real pushback on our December note arguing that the stock was wildly overvalued, and yet it is up 70% since then. What if we are all wrong, and the market is right?

Conspicuous consensus

- The thing that has most amazed me since writing sceptically of the aspiring thin-film solar giant Hanergy (566.HK; NR) in December has been the pushback.
- There hasn't been any. Everybody – from investors to journalists to industry participants – seem to agree that the stock is wildly overvalued.
- And yet it is up 70% since December, and now 324% in the past year.

The 10th man

- In zombie movie *World War Z*, Israel was saved from the zombie apocalypse by its adherence to the 10th man doctrine, which states that…
- … if 9 people look at the same information and come to the same conclusion, then it is the 10ths duty to disagree and actively look for evidence to the contrary.
- In the absence of any compelling arguments from the company itself, we've taken it upon ourselves to argue that Hanergy is an undervalued visionary tech company.

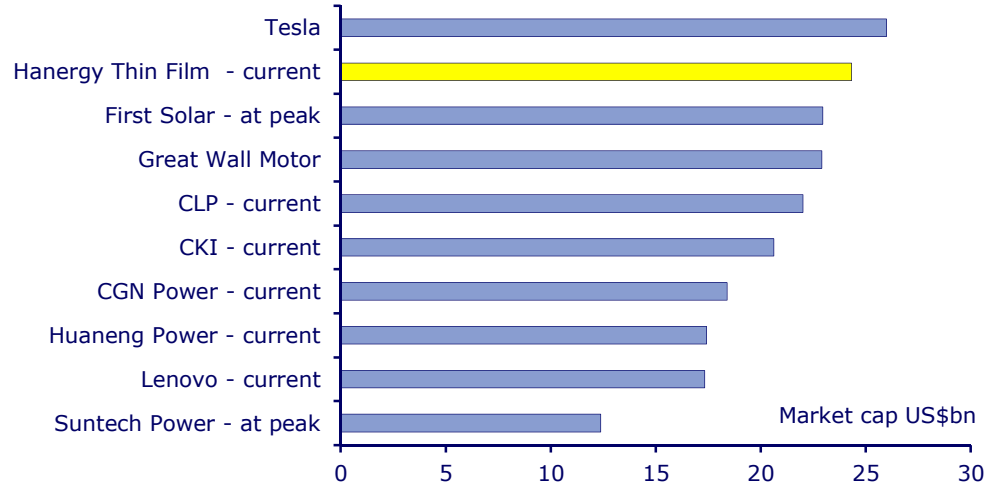
A fistful of Prozac

- The first step is to look out to 2020, ignoring the mundane figures around 2016 (let alone 2015), which we've already established cannot support current valuations.
- Assuming the technology works perfectly, we can only get to a valuation of 13x 20F PE as a commodity panel manufacturer, or 1.2x 20F PB as a solar farm operator.
- Further suspending disbelief, in a world of solar cars, smart phones and integrated rooftops, we can get to 20F PE multiples of <2x.

Re-writing the present, and a hedge

- As the 10th man, I must argue that Hanergy will overcome the staggering challenges of ramping up CIGS solar ahead of competitors like TSMC and Samsung.
- Likewise, the parent-co's use of trust products, pledged shares and controversial dam building in Burma will ultimately play to the list-co's advantage.
- Just in case, though, we could consider Hanergy's Taiwanese equipment supplier, Chroma, who works on pre-payments.

An unlikely giant



Source: CLSA

Conspicuous consensus

The most remarkable thing about all of these conversations has been the pushback

Since first writing in some detail about Chinese solar company Hanergy in December (**Global Solar (Are they really that good?))**, I've spoken to countless competitors, investors, journalists and industry people about the company. The most remarkable thing about all of these conversations has been the pushback. There hasn't been any - at least with regards to fundamentals and my view on valuations, which are 2-3x higher than what seems justified on even heroic assumptions.

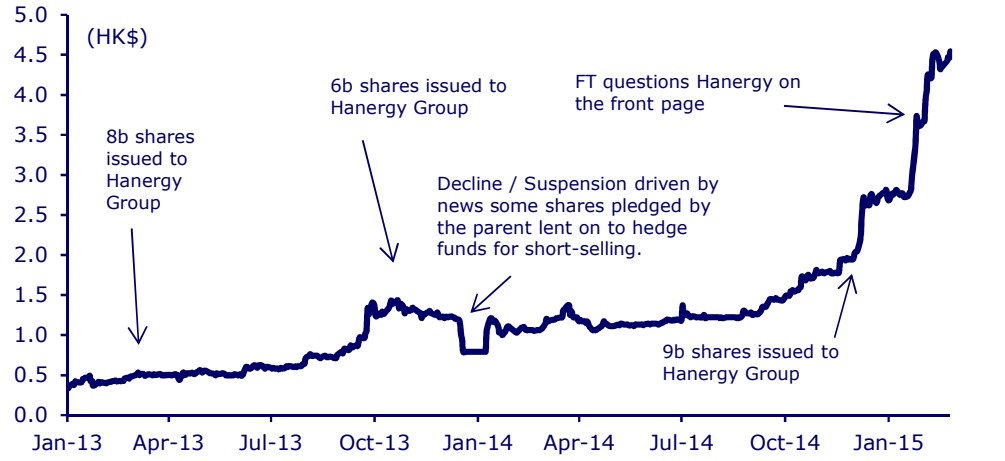
And yet the stock keeps going up…

And yet the stock keeps going up, another 70% since my note came out, bringing the 1-year gains to a cool 324%. This despite a number of articles questioning the company's breakneck growth (most notably, this front page article in the Financial Times (link)), and now this one (link) alleging that Chairman Li Hejun has been loading up on shadow banking loans.

… and up

Figure 1

Hanergy (566 HK) – Annotated share price chart



Source: CLSA, Bloomberg

Looking at this as an investor, the biggest question is simply: So what?

Looking at this as an investor, the biggest question is simply: So what? Most of these issues were equally relevant a year ago, or even longer, and the stock has looked wildly overvalued on conventional metrics for longer than that. And yet it has tripled. So, re-phrasing the question above: What Is the catalyst to force a reckoning in the stock?

According to Factset, 80.5% of shares are held by insiders (mostly the Chairman), 3.7% by institutions and 15.8% by unknown. Given the small holdings and distribution, the institutional ownership would seem to be mostly index funds. Chairman Li doesn't seem likely to sell out meaningfully anytime soon, so what is driving that 16% of 'unknown investors'?

10th Man Doctrine: *Whenever 9 people looking at the same information come to the same conclusion, it's the 10th's duty to disagree and actively look for evidence to the contrary.*

There is plenty of speculation about what is motivating this group – most of which I dare not repeat. Instead, I would like to focus on what is not being said. That brings us to the 10th man:

> *Whenever 9 people looking at the same information come to the same conclusion, it's the 10th's duty to disagree and actively look for evidence to the contrary.*
>
> Jurgen Warmbrunn in ***World War Z***.

In the 2013 zombie movie *World War Z*, Mossad agent Jurgen Warmbrunn credits the '10th Man Doctrine' with saving Israel from the global Zombie Apocalypse. Perhaps taking this 10th man or Devil's Advocate approach to Hanergy could save us from – if not a Zombie Apocalypse, at least underperforming the index or avoiding costly shorts.

What is nobody – besides, in fits and starts, Hanergy itself saying about Hanergy as a stock and as a company?

What is nobody – besides, in fits and starts, Hanergy itself ('foreign media probably don't understand Hanergy (link)) – saying about Hanergy as a stock and as a company? From what I can tell, nobody is seriously saying: **The stock is cheap because Hanergy is going to revolutionize not only the solar sector, but the energy sector according to founder Li Hejun's vision.**

What I try to do below is build an argument around this statement, and interpret recent news assuming the above to be true. My inner cynic will be given a handful of Prozac and told to be quiet.

Investors have made (and lost) many billions valuing companies on price to sales, eyeballs and other exotic metrics.

Lay of the land: Just how big is this thing now?

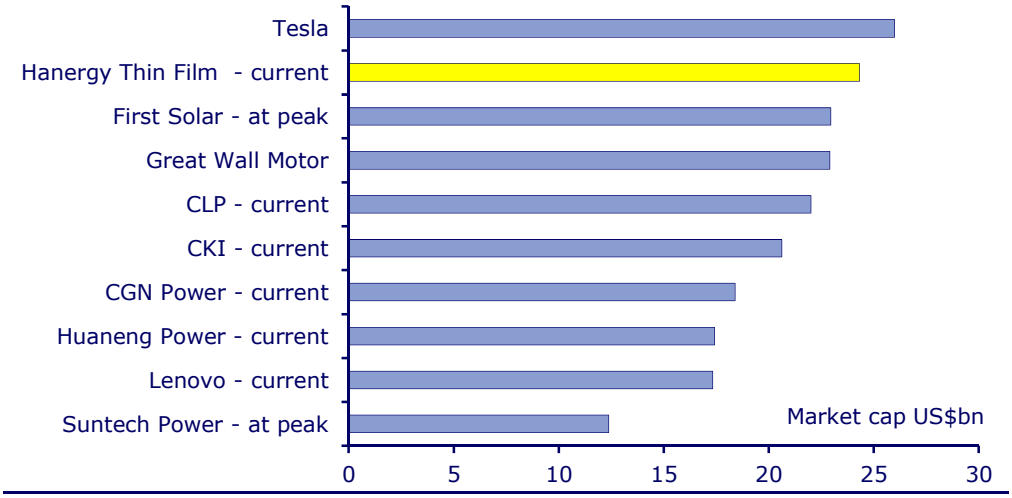
While I struggle with the valuations – among other things, that is at least partly a reflection of my day job covering tech commodity manufacturers and utilities. Investors have made (and lost) many billions valuing companies on price to sales, eyeballs and other exotic metrics. Just how big is Hanergy now?

We could look at the company as a power producer. With next to no generating assets, it boasts a market cap greater than China's biggest power producer **Huaneng** (902 HK), one of the nuclear duopoly, **CGN** (1816 HK), as well as Hong Kong-based regional utility **CLP** (992 HK) and Li Kashing infrastructure vehicle **CKI** (1038 HK). Considering the opportunity for electronic devices, Hanergy boasts a bigger market cap than **Lenovo** (992 hK); considering auto opportunities, it is bigger than **Great Wall** (2333 HK).

A giant like no other

Figure 2

Hanergy market cap vs comps past and present



Source: CLSA, Bloomberg

And then there is Tesla (TSLA US), whose market cap is now quite similar to that of Hanergy.

And then there is **Tesla** (TSLA US), whose market cap is now quite similar to that of Hanergy.

Like Hanergy, Tesla is trading on rather fancy earnings multiples (176x 15CL).

Like Hanergy, Tesla is trading on rather fancy earnings multiples (176x 15CL). Both companies are in the new energy business, selling products that aim to displace incredibly entrenched incumbents (fossil-fired power for Hanergy; internal combustion engines for Tesla). The valuations for Tesla only make sense if you believe that their share of the market will grow spectacularly, and – by extension – that the helmsman, Elon Musk, is a true visionary rather than a mere megalomaniac.

Mr Musk has passed that line of super-credibility that allows him to say things like (link) the below:

> "…if you take this year's revenue, around $6b or thereabouts, and if we are able to maintain a 33% growth rate for 10 years and achieve a 10% profitability number and have a 20x PE, our market cap would be basically the same as Apple's is today,"

Considering what we know about Hanergy's business, how could it look in the best of all possible worlds by 2020?

There is something to be said for removing the shackles of 1-2 year earnings forecasts for a bit. Perhaps this is what Hanergy's investors have managed to do. Considering what we know about Hanergy's business, how could it look in the best of all possible worlds by 2020?

Taking a page from Musk's playbook

Considering this as a pure technology company, the sky is the limit. But even with the most Pollyanna of outlooks, Hanergy is not a software or internet company – they cannot simply print more money without more capex. In the scenarios below, I still also could not bring myself to ascribe value to the legacy thin-film business. If this was really working as billed, they would not have made the leap into CIGS. So, rather than the past, let us dwell instead on the future.

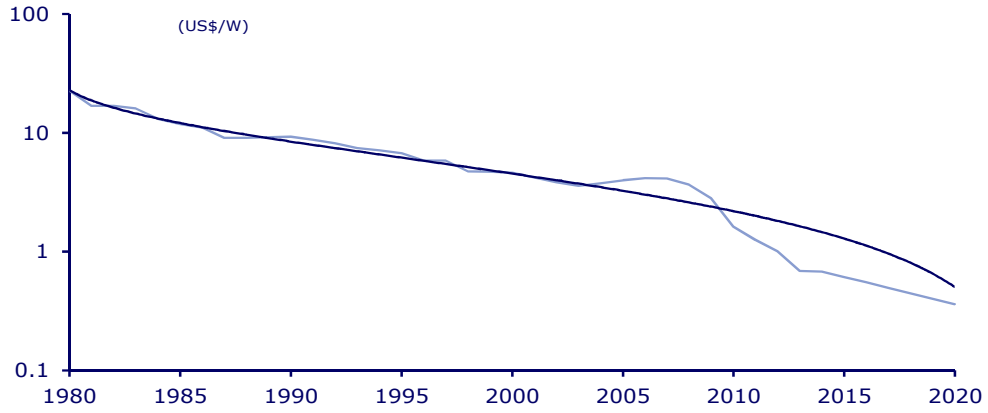
Option 1 – Plain vanilla panels. First, let's consider Hanergy the list-co as a pure panel manufacturer, if nothing else because it is easiest to conceptualize.

The technology works as billed,with Hanergy's Solibro lines churning out panels at US$0.35/W by 2016 (vs US$2.4/W today)

1. The technology works as billed – possibly even a bit better, with Hanergy's Solibro lines churning out panels at US$0.35/W by 2016 (vs US$2.4/W today), and falling to US$0.20/W by 2020 (-13% CAGR from 16-20).

Solar – Long-term panel prices (Log scale)

Since 1980, solar panel prices have followed a learning curve by which prices have dropped c.20% for every cumulative doubling in capacity.



Source: CLSA

US$0.42/W ASP.

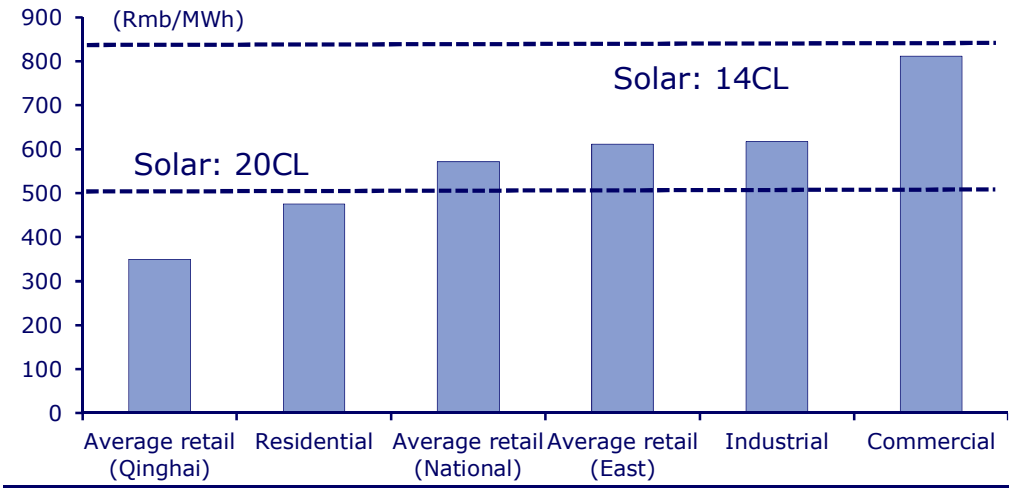
In short, solar will be a big market – without subsidies by 2020.

2. The CIGS panels prove reliable enough, and the lower weight useful enough, to sell at a premium to crystalline panels, which we have at US$0.38/W by 2020. Let's assume a 10% premium, so US$0.42/W ASP.

3. Before going on, let's consider the implications of these numbers. With US$0.42/W panels, installation costs in China would fall from c.US$1.2/W to c.US$0.8-0.9/W, or quite possibly lower with the lighter thin-film panels and improved racking, installation planning. Solar would be cheaper than current retail power prices across much of the country, and residential power prices in coastal provinces. If power prices were to move up to pay for China's massive grid infrastructure projects or environmental clean-up, then the returns would be faster. And returns would be faster in most other markets around the world. In short, solar will be a big market – without subsidies by 2020.

Figure 3

Solar and grid parity in China



Source: CLSA, Winds

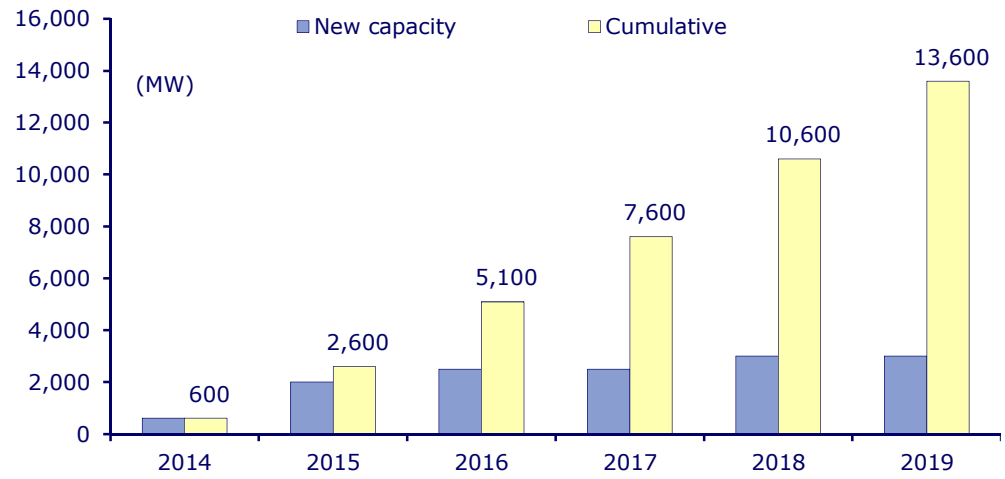
How much of that market could Hanergy grab? In this scenario, we've already established that the technology produces panels that are cheaper and better-received than conventional panels, even at a premium. Thus, they could grab as much of the market as possible. The limiting factor would be capacity.

4. We assume that (1) as the CIGS lines are de-risked, they are injected (at a fair value) into the list-co, and subsequent expansion all takes place at the list-co, so by YE19 capacity reaches 13.6 GW.

Assuming a capacity ramp up to 13.6 GW

Figure 4

Hanergy – Manufacturing capacity (MW)



Source: CLSA

5. Given low ASPs, even these bold assumptions would not lead to really exciting numbers for 2020: 13.6 GW at US$0.42/W and US$0.20/W COGS would lead to US$5.7b sales and US$2.9b gross profit. Assuming no debt (capex could comfortably be funded through cashflow), 10% opex and 25% income tax, this leads to US$1.8b net profit, or HK$14.1b.

6. Conclusion: **This would put Hanergy on 13x 20F PE**.

Instead of sell panels, the Hanergy list-co uses all of its panels to build projects

Option 2 – Build & flip: Too boring

While the above is not horrible, necessarily, it is barely exciting. Let us then consider another scenario where everything works out as described above, but instead of selling panels, the Hanergy list-co uses all of its panels to build projects which it then flips. What would earnings look like in 2020?

1. Based on our cost declines above, Crystalline panels would be able to achieve a 9% equity IRR at Rmb0.65/W, 6.5% interest rate, 2/3rd gearing and average Chinese sunshine levels (1400 hours).

2. Ultimately, this only slightly increases profit, unless there are significant reductions to installation costs stemming from scale, etc. Ultimately, given the margins in manufacturing, not to mention the implied scale, the build & flip model seems relatively unattractive.

3. Conclusion: They would more likely go for option 1 above. Thanks to fat margins for panels (not generally the case with commodity panels), they get the same sort of earnings with substantially smaller working capital, etc requirements.

Another option would be to keep all of these projects on their books

Option 3 - Keep all projects on the books.

Assuming Hanergy is able to build projects with attractive returns, which they would with US$0.20/W panels, then another option would be to keep all of these projects on their books and become a straightforward IPP. Below is a *very* simple model of what that could look like.

1. For these purposes, we assume that all panels produced are used internally and used to generate 12% ROEs in solar farms / rooftop

installations. Their 2020 installed capacity would be a rather astonishing 57 GW, putting Hanergy in-line with the big thermal IPP list-cos.

2. Keeping everything in-house would naturally make Hanergy lever up, and cashflows likely would not cover capex until 2018 or later. Equity raises would be inevitable, accompanied or substituted by some project flips or panel sales to shore up cash positions.

Hanergy would be trading on 1.2x 20F PB.

3. **Under this sort of scenario, Hanergy would be trading on 1.2x 20F PB. Over 20% ROE, the company dips below 1x 20F PB.**

Figure 5

Hanergy – Keeping it all on the books

	2014	2015	2016	2017	2018	2019	2020
Cumulative installations	600	3,200	8,300	15,900	26,500	40,100	56,701
Capex (Rmb / W)	7.2	6.5	5.9	5.4	4.9	4.4	4
Capex (Rmb m)	4,320	16,973	30,186	40,786	51,577	59,999	66,404
Equity portion (33%)	1,440	5,658	10,062	13,595	17,192	20,000	22,135
Net profit (12% ROE)	173	852	2,059	3,691	5,754	8,154	10,810
Book value (start)		1,613	8,122	20,244	37,529	60,476	88,629
Book value end (Rmb m)	1,613	8,122	20,244	37,529	60,476	88,629	121,573
Book value (HK$)	**2,000**	**10,072**	**25,102**	**46,537**	**74,990**	**109,900**	**150,751**

Source: CLSA

I'm also just treating these panels as commodity products, and treating Hanergy as a tech commodity supplier and/or IPP, not a tech visionary.

Option 4 – iPads, iCars and the works. I have to admit to having betrayed the spirit of this exercise a bit in the calculations above. On one hand, I'm already giving the company huge benefit of the doubt in assuming that they are able to ramp a new technology without snags (more below). But I'm also just treating these panels as commodity products, and treating Hanergy as a tech commodity supplier and/or IPP, not a tech visionary.

The reality is that Hanergy is looking to manufacture cars (link) by October of this year, work its panels into building materials everywhere and get solar built into mobile products of all shapes and sizes, including drones (link). On February 4, the company launched its 'global thin-film solar PV product innovation competition' (link). While the award is not yet clear, the company is inviting designers to build solar into phones, buildings and a whole range of products.

The company projects the solar car market to reach 46 GW by 2020

The company projects the solar car market to reach 46 GW by 2020, based on 5-10 million Electric Vehicles (EVs) (link). The company also estimates that the overall power consumption of 6 billion smart phones in 2020 will surpass 24b kWh. Assuming 1400 hours generation pa, that implies around 17 GW of cumulative demand from smart phones as well.

It is clear that Hanergy wants to get involved with more than just supplying panels to these products. But assuming that the company will be able to successfully launch various name brands (a solar phone to rival the iphone, a solar car to rival Tesla, a solar stroller to rival Stoke, etc, etc) introduces far too many variables to even get back-of-envelope numbers.

Customized panels can lead to selling prices that are higher per Watt.

Instead, for option 4, we will consider that selling materials with embedded panels or selling small, customized panels can lead to selling prices that are multiples – sometimes many – higher per Watt. Military gear can fetch

US$10s per Watt of solar, as can portable chargers. We don't have to go that far before numbers start getting crazy, though.

Simply plugging in an ASP of US$2/W into scenario 1 above, or roughly in-line with what the parent company is charging the list-co for building integrated solar (calculations from their Feb contract below) yields pretty extraordinary numbers.

Selling 13.6 GW of US$2/W panels produced at US$0.20/W would lead to net profit in the US$16b / HK$127b range. This would put Hanergy on 1.4x 20F PE

Selling 13.6 GW of US$2/W panels produced at US$0.20/W would lead to net profit in the US$16b / HK$127b range. **This would put Hanergy on 1.4x 20F PE**. Wow.

Of course there are a lot of variables to consider here, chief among them:

- Could the market support >13 GW pa (from almost nothing today; more on this below) of building and device integrated solar by 2020? That's a big ask, even before we consider the cumulative installations of 50-odd GW leading up to it. At 10% conversion efficiency, 10 GW would take up 100m m2, or 100 square km – smaller than Liechtenstein, but bigger than San Marino. Presumably, some of this multi-GW shipment would have to come in the form of plain vanilla panels.
- Would ASPs hold up with such a big ramp? Almost certainly not. Though part of our glass ~~half~~ all-full analysis implies that nobody is really competing with Hanergy at the low-end, high-volume, light thin-film portion of the market, so competition would not drive down demand. Also, mobile products could garner much higher than US$2/W ASPs.

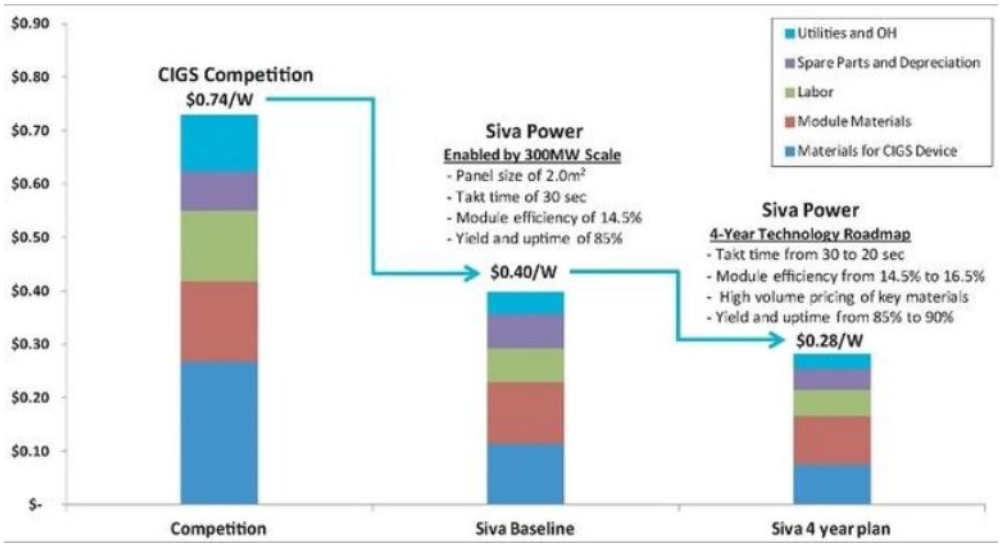
Revisiting the technologies: The Real Deal

The core of Hanergy's drive to dominate solar (and more) is made up of a handful of Western thin-film solar technologies that the company purchased in 2012-14. We wrote about these in some detail in December, but the cost roadmap below is a reminder if you don't want to flip back to that report. For comparison's sake, the cheapest Chinese crystalline-silicon (c-si – mainstream technology) producers are at around 50 cents per Watt.

Cost roadmap to 28 cents / W by 2019

Figure 6

Cost roadmap for Siva Power vs around 50 cents/W for leading incumbents



Source: Siva Power

Siva Power is another company producing panels with the same sort of chemistry (CIGS)

Oops. The only problem with this chart is that it does not come from one of Hanergy's technologies. Siva Power is another company producing panels with the same sort of chemistry (CIGS) that has been kicking around for a while (since 2006) and has just (link) gotten another round of investors including the city of Wuxi. Like many of the other thin-film technologies that have thus far failed to scale, Siva boasts a long list of tech and investment gurus (link). This is not to say that the technology will not scale, but that challenges were much greater than originally anticipated.

Siva uses a co-evaporation process, similar to Solibro, one of the two technologies that Hanergy is really trying to ramp (with a 300 MW fab slated to open in 1H15). From a manufacturing perspective, this is entirely different from the sputtering process employed at the facility Hanergy is building next to the Solibro fab, which is based on MiaSolé 's technology.

One of the standouts is Stion, which raised more than US$200m from TSMC and Khosla Ventures

However, there are also plenty of heavyweights trying to develop CIGS capacity using a sputtering process. One of the standouts is Stion, which raised more than US$200m from TSMC and Khosla Ventures among others, and is now controlled by Khosla Ventures. For its part, TSMC has been selling CIGS panels globally (link), as has Samsung, which has occasionally held the conversion efficiency record for CIGS. Then, of course, there is Japan's Solar Frontier which is by far the biggest producer of CIS solar panels, with around 1 GW operating capacity.

To a renewables geek / technophile like myself, they are incredibly exciting, especially MiaSolé and Alta Devices

This time is different

My point with all of this is not that the technologies that Hanergy bought – MiaSolé , Solibro, Alta Devices, Global Solar – are unattractive or won't work. To a renewables geek / technophile like myself, they are incredibly exciting, especially MiaSolé and Alta Devices, and potentially revolutionary. Not only that, they have been vetted by people infinitely smarter and more qualified than myself, with major investments (money) from Silicon Valley luminaries and (time) tech manufacturing veterans.

The problem is that all of these guys lost their shirts no these investments, which is what allowed Hanergy to pick them up so cheaply. In the spirit of the 10th Man, we have to consider what would enable Hanergy to succeed (1) where so many others have failed; and (2) where so many other big, legitimate contenders are still competing (ie – the other technologies listed above, as well as many more, look equally promising).

Where no man has gone before

What does Hanergy bring to the table that was lacking previously for these technologies – especially Miasole?

First, simply scale.

First, simply scale. Except for Solar Frontier, nobody has tried to ramp up a sexy CIGS thin-film technology to real (100s of MW) scale. TSMC seems to be getting there slowly while Samsung seems to be wavering and Solar Frontier is arguably using a fundamentally expensive process. Hanergy is roaring ahead with 2x 300 MW fabs that should be up and running in 1H15.

Second, synergies.

Second, synergies. I struggle a bit with this one since the technologies that Hanergy bought use such wildly divergent processes. However, these companies have been very secretive historically, and operating in small silos cannot have been helpful to the manufacturing process.

Third, end markets for the early days.

Third, end markets for the early days. Even if Hanergy manages to hit its goals, sales over the next year or two will be tricky given relatively unproven technologies (vs 170 GW or so of c-si panels out there) and high costs to begin with. Hanergy has both the parent company – a sizeable private IPP, and the easily the most valuable solar company in the world by market cap to drive demand in the early days.

Fourth, money. Sweet, sweet money.

Money: Sweet, sweet money

It is natural to be sceptical about the company's finances

Given how secretive Hanergy's parent is, as well as the unusual trading around the list-co, it is natural to be sceptical about the company's finances. This was only exacerbated by last year's announcement that Chairman Li had pledged 5bn shares as collateral on a loan, not to mention by a recent FT article (link below) detailing how the group has loaded up on high-interest trust products. Recurring concerns about the parent paying on time also hurt (we wrote about this in December, but also covered by David Webb here (link).

Enough about the risks, though; let us consider the positives.

Enough about the risks, though; let us consider the positives. While very little is known about Li Hejun, China's Richest Man (link), his focus and fortune do seem to be firmly / exclusively linked to renewable energy. Thus, he would presumably (again, no transparency, so we don't know) be spending the Rmb3.5b in trust products (FT), HK$345m loan on pledged shares and US$1b (from Mr Li; c.Rmb4b on our estimates) in cashflow from hydro power each year on initiatives that will propel the group's solar business, and ultimately benefit shareholders in Hanergy (566.HK).

There is one other clear draw on resources: the construction of a controversial 1.4 GW dam in Burma.

Actually, there is one other clear draw on resources: the construction of a controversial 1.4 GW dam in Burma. But otherwise, what could Chairman Li and the group be buying with that debt, other bank debt and the cashflow from hydro?

If you had a listed company trading at some 38x sales, wouldn't you be tempted to borrow against those shares

For the sake of this exercise, we would have to assume that Mr Li is using this money to secure downstream solar pipeline and buyers, which will subsequently be injected (at a fair / cheap) valuation into the list-co. If anything, investors should be reassured by Mr Li's shrewd and creative use of capital markets and debt, which will ensure that the company has sufficient access to capital as it pursues its thin-film vision. Beyond that, if you had a listed company trading at some 38x sales (all to your unlisted company), wouldn't you be tempted to borrow against those shares?

The latest FT article

On Feb 17, the FT released an article detailing how Li Hejun has been 'loading up on high interest shadow banking loans'

On February 17, the Financial Times released an article detailing how Hanergy Chairman Li Hejun has been 'loading up on high interest shadow banking loans' (link). Considering that Hanergy did not come out immediately with a rebuttal, we could reasonably assume that the FT claims are defensible, but we have not independently verified them.

According to the article, as repeated by Bloomberg:

- Hanergy Group has raised at least Rmb3.5b through trust products over the past two years.

- Interest rates are 7.5-10.5%, suggesting a cost – with fees – of 8.5-11.5% for Hanergy.
- On Feb 5, Hanergy sold a private jet to a small listed HK company in a sale and leaseback agreement.

Mr Li said in an interview with CNBC supplies $1b net cash flow each year.

Where the money flows like water

According to the FT article, most of this debt is tied to Hanergy's Jinanqiao hydro plant, the largest in its fleet that Mr Li said in an interview with CNBC supplies $1b net cash flow each year. Given the lack of data to evaluate that number, we cannot say for sure whether it is right. Based on our rough estimates, around Rmb4b (pre-tax) cashflow for the 6 GW total hydro assets reported at Hanergy's parent, or Rmb2b for the Jinanqiao dam seems about right.

First, what hydro assets does Hanergy actually have? On its web-site, the company talks of 6 GW hydro capacity, although only 3.1 GW is broken down (3 GW of it at the Jinanqiao Dam). We'll get back to that, but assuming 6 GW is the right number, we estimate (very roughly) that pre-tax cashflow could be in the Rmb4b range.

Our key assumptions are just that – assumptions, since there is almost no real data to work around, and hydro is much more site specific than thermal or other renewable energy assets. We are basing tariffs, costs and utilization on national averages and performance at Huadian Fuxin and CPI. For interest rates, we are sticking more to PBOC than the trust product rates above (6.5%). Overall, the implied ROE of just under 10% basically makes sense.

Figure 7

Rough estimates on cashflow from Hanergy Group's hydro

Size (MW)	6,000	Power gen (m kwh)	27,000
Capital cost (Rmb m / MW)	7	Revenue (Rmb m)	8,100
Gearing level	66%	Opex (Rmb m)	(1,200)
Utilization (hours)	4,500	Ebitda (Rmb m)	6,900
Tariff (Rmb/kwh)	0.3	Interest payment (Rmb m)	(2,948)
Opex (Rmb m pa / MW installed)	0.2	**Ebtda (Rmb m)**	**3,952**
Int rate (%)	6.5%	Depreciation	(2,100)
Term (years)	15	PBT	1,852
Annual int payment (Rmb m)	(2,948)	Tax	(463)
Capex	42,000	PAT	1,389
Debt	27,720		
Equity	14,280		

Note: Based on data from Hanergy website, Jinanqiao running at 4,333 hours utilization, and capital cost of Rmb6.7/W; Source: CLSA

For Jinanqiao alone, that figure would be roughly half, or in the Rmb2b pa pre-tax cashflow

But the above calculations are, again, based on 6 GW capacity. For Jinanqiao alone, that figure would be roughly half, or in the Rmb2b pa pre-tax cashflow, unless we are off by a magnitude in either utilization or tariff – even revenue would be just above Rmb4b. And that is assuming 100% ownership by Hanergy Group.

We are not entirely sure how to get to 6 GW hydro capacity for the group. Beyond the 3 GW Jinanqiao, the group's website breaks out three small dams with combined 82 MW capacity. The group is also working on the Kunglong Dam on the Salween River in Burma. A company update from 2010 (here) doesn't give much information. Activists (here) and local media (here)

indicate a 1.4 GW dam was agreed to in 2007 and is slated for completion in 2018.

The project has been mired in controversy

However, according to the reports linked above, as well as this one (link), the project has been mired in controversy, with locals in the restive Northern Shan state areas strongly opposed to the dam and pushing (sometimes with explosives) to prevent its completion. (Perhaps this will shift to solar?)

The new agreement: Big vote of confidence?

On February 18, Hanergy (566.HK) released (link) a Master Supply agreement to buy around 2.3G W of panels each year from 2015-17 from its parent

On February 18, Hanergy (566.HK) released (link) a Master Supply agreement to buy around 2.3G W of panels each year from 2015-17 from its parent. This appears to be non-binding, but if all goes according to the published plan, they would at last go some way to explaining the mystery of what is being done with all that equipment that the listco has sold to its parent, who has hitherto sold or installed astonishingly few panels considering the nameplate capacity of 2.4 GW as of 2014.

Cynics might dwell on the 50% prepayments that the list-co has to pay to the parent for panels. For the purpose of this exercise, though, we should see it as a strong sign that the parent is ramping up its new CIGS lines faster than expected, and has made good progress as well into its foray in building-integrated materials.

Figure 8

ddd

	2015	2016	2017
A-Se/Si-Ge (List-co's original technology)	1500	1500	1500
CIGS flexible panels (MiaSolé 's technology)	70	70	70
CIGS panels (Solibro's technology)	80	80	80
nc-Si panels (nano-crystalline silicon; ie – based on co's original tech)	110	110	110
BIPV* (could be any of the technologies)	530	530	530
Total	**2290**	**2290**	**2290**

Note: BiPV agreement set at 5.3m m2; our calculation here based on assumption of 10% conversion efficiency; Source: Company, CLSA

Where are these panels going?

So far, all we know of is c.600 GW (of which 400 GW is in Ghana).

For the list-co to take such a big chunk of panels each year, it would have to have a large pipeline of projects in which to ues them. So far, all we know of is c.600 GW (of which 400 GW is in Ghana). However, the company has not been very transparent about its pipeline even on an MOU basis, let alone broken down by early-stage / late-stage pipeline. The list-co could also conceivably pass along some of the panels to Ikea, though those sales would make more sense directly from the parent-co.

The natural assumption, as indicated above, would be that the parent-company has been building up pipeline for projects that it will pass along (presumably / hopefully at a reasonable price) to the list-co, who will go on to develop said projects.

Pricing

The prices in the contract (below) basically make sense. Current ASPs in China are roughly around where the contract price is set for CIGS panels.

There is no standard ASP for BIPV installations, given that they are really site dependent, but prices are naturally quite a bit higher than for traditional rooftop or solar farm installations.

For the CIGS and nc-Si panels, prices really should be dependent upon costs of production, which has not yet ramped. As we discuss above, that is a big challenge. For A-si/Si-Ge, the questions would be around reliability and other issues that seem to have kept third parties from actually buying them in volume.

Figure 9

ddd

	Rmb/W	US$/W	Implied sales (Rmb m)
A-Si/Si-Ge	3.3	0.53	4,950
CIGS flexible panels	4.1	0.66	287
CIGS panels	3.76	0.60	301
nc-Si panels	3.6	0.58	396
BIPV*	13	2.08	6,890
Total			**12,824**

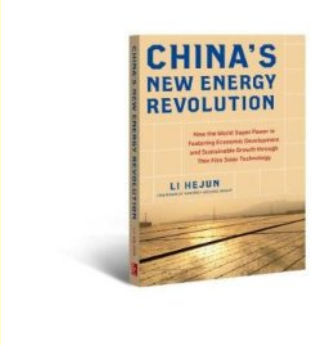
Note: ASPs are a cap. Source: Company, CLSA

Payment terms are basically that the list-co has to pre-pay 50% to the parent.

Payment terms are basically that the list-co has to pre-pay 50% to the parent.

- 30% within 10 business days of execution of the relevant supply sub-contract
- 20% within 5 business days of approval by Hanergy Group of the placement of the purchase order. (The Hanergy Group commits to supply the products within six months after the day which the Group has duly paid the 20% manufacturing fee.)
- 45% within 30 business days of delivery of the panels
- 5% 1 year after delivery

Li Hejun: China's Musk or this decade's Dr Shi?



Most commentary about Hanergy's Chairman Li Hejun (including ours) has focused on two things: (1) how little we know about him; and (2) how rich he is. China's richest man deserves more than that, and the 10th man argument falls apart immediately if Mr Li is anything less than an incredible visionary. Imagine Apple without Jobs or Tesla without Musk.

Given that this is Mr Li's first real big push, it is a bit early to say whether he could end up like either of these two gentlemen. Based on what little is available in interviews and in his new book (Amazon link here; still waiting for my copy), he definitely does seem to bring some intellectual gravitas to the task, quoting the likes of Jeremy Rifkin. He also shows frequently how he might be smiled upon as Vice Chairman of the All-China Federation of Industry and Commerce. For example, from a NYT interview:

> *'Every important industrial revolution has actually been an energy revolution or an energy substitution, first with coal for wood, then oil for coal and now clean energy. Each revolution witnessed the rise of a great power, first the United Kingdom, then the United States, and the third revolution could be led by China.'*

Mr Li's legacy also eschews money and profits like Mr Musk:

> *"I expect we'll achieve profitability in 2020." -- Elon Musk (link)*

"I did not make those investments to make more money, because I already had enough money from the hydropower projects." – Li Hejun

"I did not make those investments to make more money, because I already had enough money from the hydropower projects." – Li Hejun

His legacy is also tied to successful production of the CIGS capacity. Every indication is that he believes he can pull it off. Alas, that alone is no guarantee for success. Rather than Elon Musk, the template could be Shai Agassi, the bombastic founder of collapsed battery-swapping start-up Better Place (incredible story if you have time - here).

Or, of course, there is the former Chinese king of solar, former Suntech CEO Shi Zhengrong. In 2007-08, he was among the richest people in China, but whereas later moving competitors bounced back from the GFC, Dr Shi never quite recovered from over-reach and hubris. It could be some comfort to Mr Li that Dr Shi was still worth US$330m as of 2013 (link), even after the company he founded delisted, defaulted and went bankrupt.

Figure 10

Cleantech valuation table:

Stock	Ticker	Price (local)	Mkt Cap (USD,m)	ADTV (USD,m)	2014 PE	2015 PE	2016 PE	2014 PB	2015 PB	2016 PB	2014 1H net gearing (%)	Performance (%) 1m	3m	6m	12m
Wind															
Renewable operators															
Longyuan	916 HK	8.39	8,695	13.8	17.0	13.0	10.0	1.6	1.4	1.3	146.4	(3.6)	(1.2)	0.7	(11.1)
Huaneng Renewables	958 HK	2.70	3,387	8.3	14.5	10.0	8.6	1.3	1.2	1.0	197.3	(2.2)	(3.9)	(5.9)	(21.5)
Datang Renewables	1798 HK	1.06	994	0.3		19.9	13.0	0.7	0.6	0.6	323.8	1.9	(6.2)	(15.2)	(31.6)
Huadian Fuxin	816 HK	3.60	3,903	12.2	11.2	9.1	7.1	1.5	1.3	1.2	305.9	(4.8)	(12.6)	(21.6)	(7.9)
China Wind Power	182 HK	0.45	513	2.2	9.5	6.2	5.5	0.7	0.6	0.6	9.6	0.0	(16.0)	(39.9)	(36.4)
China Suntien	956 HK	1.50	719	1.3	12.0	9.0	7.0	0.6	0.6	0.5	99.7	(15.7)	(23.9)	(36.2)	(53.0)
Beijing Jingneng	579 HK	3.21	2,844	5.3	12.3	8.3	6.9	1.4	1.2	1.1	191.2	3.5	(15.1)	(8.0)	(29.6)
Wind Equipment															
Goldwind	2208 HK	11.76	5,872	4.6	14.8	12.4	12.0	1.7	1.5	1.4	59.0	(7.7)	(3.1)	(3.4)	36.4
Sinovel	601558 CH	4.26	4,103	8.0							24.1	25.7	59.4	90.7	55.1
Guodian Tech	1296 HK	1.05	821	0.7	7.2	6.1	7.7	0.5	0.5	0.5	159.6	4.0	(34.8)	(37.1)	(59.3)
Mingyang	MY US	2.24	274	0.9	5.2	6.1	3.9	0.5	0.4	0.4	19.1	4.7	(17.0)	(28.4)	(20.0)
China High Speed	658 HK	5.08	1,071	2.9	12.1	9.7	9.3	0.7	0.7	0.6	95.9	(9.8)	(10.1)	(18.8)	(4.3)
Dongfang Electric	1072 HK	15.92	6,867	7.7	13.4	14.7	14.9	1.3	1.2	1.1	(20.0)	(2.1)	12.0	20.6	40.4
Shanghai Electric	2727 HK	4.63	17,336	23.7	22.2	22.4	23.1	1.4	1.3	1.3	(41.0)	(6.1)	(1.3)	31.2	82.3
Solar															
Silicon															
GCL	3800 HK	1.85	3,695	20.7	13.8	13.1	7.7	1.5	1.3	1.1	221.3	5.7	(13.1)	(34.6)	(32.0)
Daqo	DQ US	20.53	215	2.4	7.6	4.2	3.2	0.8	0.7	0.6	180.2	6.0	(37.9)	(39.0)	(55.4)
TBEA	600089 CH	12.24	6,335	225.7	20.4	15.6	12.8	2.1	1.9	1.7	62.7	(8.0)	18.7	37.1	26.8
Ingots/ Wafers															
Solargiga	757 HK	0.28	116	0.2							145.4	1.8	(23.3)	(37.8)	(24.3)
Comtec Solar	712 HK	0.98	176	0.4	22.6	12.8	12.6	0.6	0.6	0.7	7.4	(1.0)	(16.2)	(35.9)	(30.0)
Cells															
Shenzhen Topraysolar	002218 CH	9.85	771	9.9	67.9	31.3	18.6	3.2	2.9	2.5	25.5	1.5	2.4	(5.1)	10.9
JA Solar	JASO US	8.73	420	12.8	9.1	6.8	5.4	0.5	0.5	0.4	31.7	9.4	(7.2)	(5.3)	(20.4)
Integrated Modules															
Trina	TSL US	10.54	971	26.3	12.2	9.2	7.8	0.8	0.8	0.7	66.8	20.3	(2.5)	(14.3)	(29.7)
Yingli Green Energy	YGE US	2.18	396	3.6				17.4			640.9	14.1	(26.8)	(38.8)	(64.3)
Jinko Solar	JKS US	21.61	665	23.9	6.7	5.9	5.1	1.5	1.2	1.0	168.0	21.0	(12.7)	(26.1)	(29.4)
Canadian Solar	CSIQ US	29.73	1,632	72.7	7.2	6.7	5.7	3.5	1.6	1.3	257.1	48.9	8.2	(16.2)	(30.3)
Hanwha Solarone	HSOL US										217.5				
Shunfeng	1165 HK	5.22	1,949	3.4	28.1	13.6	7.0				211.5	(14.6)	(23.0)	(47.3)	(25.6)
Hareon Technology	600401 CH	7.55	1,899	63.6	21.6	13.6	10.6	2.2	1.9	1.6	214.5	(24.2)	(15.3)	(22.9)	(7.4)
Risen Energy	300118 CH	8.36	868	20.6	31.5	18.2	14.5	2.6	2.4	2.2	41.2	0.7	(11.8)	(0.5)	8.4
Integrators and installers															
Singyes	750 HK	10.42	935	4.8	9.0	6.9	5.9	1.8	1.4	1.2	25.2	(8.3)	(21.8)	(23.5)	16.9
Solar operators															
United PV	686 HK	0.94	575	3.2	72.3	18.1	9.4	1.2	1.1	0.7	465.3	(5.1)	(1.1)	1.1	(31.4)
GCL New Energy	451 HK	0.76	1,359	2.8							252.1	(16.5)	(36.7)	71.8	77.8
Equipment															
Hanergy	566 HK	4.54	24,382	36.2	56.8	64.9	64.9	10.3	9.3	8.1	(2.1)	34.3	132	249.2	334.1
Inverters, materials and consumables															
Xingda	1899 HK	2.22	432	0.4	7.6	6.8	6.0	0.5	0.5	0.5	16.4	(10.8)	(20.7)	(28.2)	(45.0)
Xinyi Solar	968 HK	2.33	1,827	5.0	28.2	14.3	11.1	4.1	3.3	2.7	(10.2)	13.1	1.3	(2.9)	33.9

Source: Bloomberg, CLSA

Appendix: What does 2.3 GW pa mean?

As it happens, the 2.3 GW figure is not far off our original 'Uber bull' scenario used in Dec-14 to arrive at a rough valuation. We had been assuming a 2 GW pa installation (vs an already generous 1 GW pa installation for base-case). Adjusting up to 2.3 GW pa, and assuming a 2x 15F PB valuation for the downstream business on top of 20x 15F PE for the equipment business – both already quite stretched multiples vs the comp groups, then the fair value for Hanergy (566.HK) would be around HK$64b, or 65% downside.

Figure 11

Hanergy list-co downstream business (solar farms / distributed generation)

	2014	2015	2016	2017
Start (MW)	0	100	2500	4900
New (MW)	100	**2300**	**2300**	**2300**
End (MW)	100	2400	4700	7000
Effective capacity (MW)	20	580	2980	5380
Capex (Rmb / W)	8	7.6	7.2	6.9
Capex (Rmb m)	800	18,240	17,328	16,462
Debt / Equity		70%		
Equity value (Rmb m)	240	5,472	5,198	4,938
Cumulative (Rmb m)	240	5,712	10,910	15,849
Retained earnings (downstream)	12	343	1,760	3,178
Book value (HK$m)	**315**	**7,568**	**15,838**	**23,783**

Source: CLSA

Figure 12

Back of envelope valuation on Hanergy

	15F - Uber bull	Comments
PE on equipment earnings (x)	20	2 GW pa from 15
Implied valuation (HK$b)	48.8	
PB on solar farm business (x)	2	2.3 GW pa from 15
Implied valuation (HK$b)	15.1	
Combined	**64.0**	
Implied PE - 15F	27.3	
Implied PE - 16F	17.0	

Source: CLSA

Companies mentioned

First Solar (N-R)
Hanergy (N-R)
Suntech Power (N-R)

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