

OLIVER WYMAN



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Solar Power

Investing opportunities in the coming growth phase

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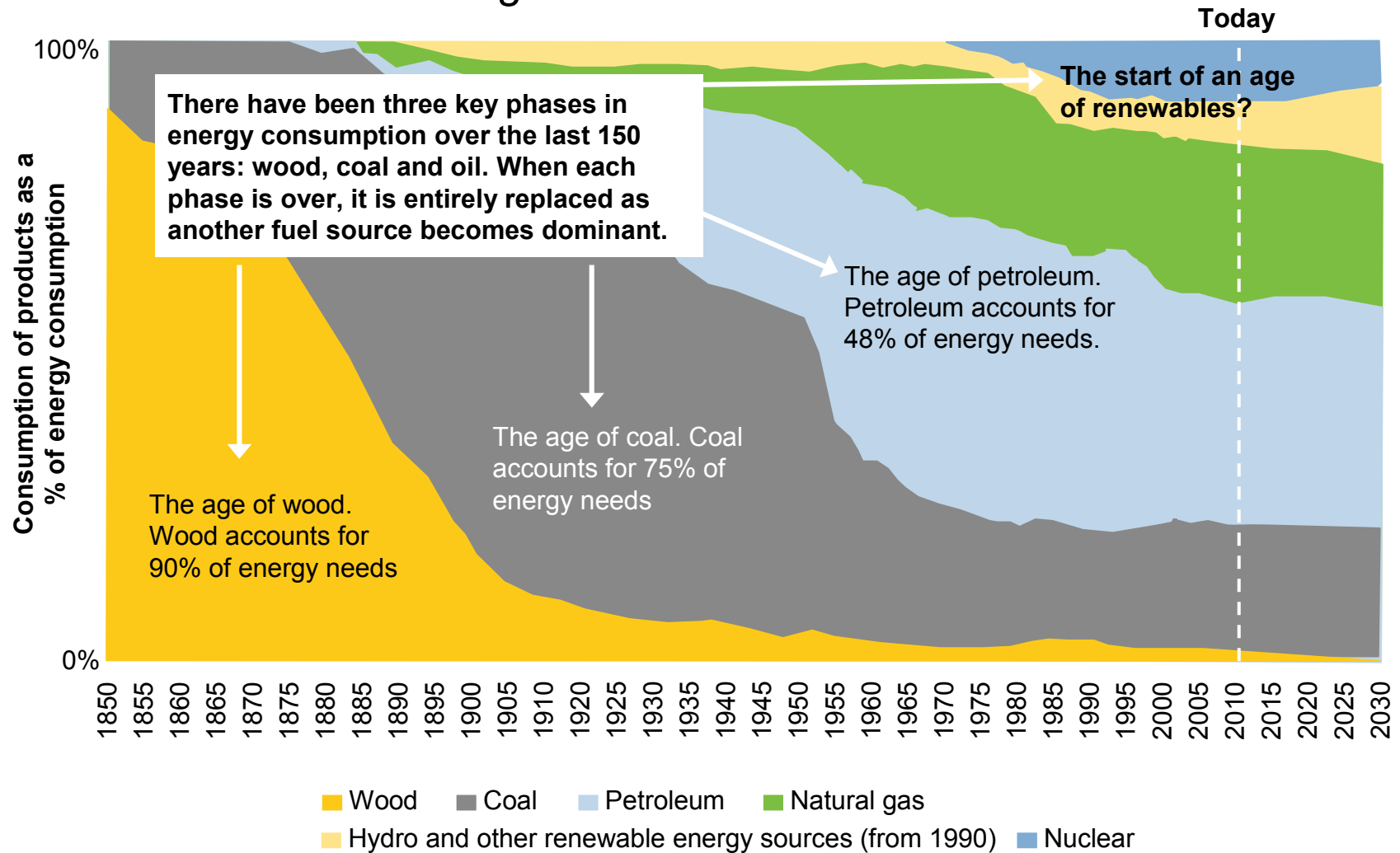


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- 2. The Future: Our forecast of the future of customer demand in the solar space**
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Energy's new natural order

Renewables are a growing share of energy consumption and we may be at the start of a new age of renewables



Source: Goldman Sachs, EIA, IEA, Oliver Wyman

The future

The strong global growth in Solar comes along with significant changes in patterns of customer demand

Strong PV Market Growth

- Since 2005, PV has grown by on average 63.1% per year [CAGR]
- Two growth scenarios
 - **Moderate:** Overall PV market growth of ~8% p.a. until 2015
 - **High:** Breakthrough innovation, cost reduction, or higher subsidies could spur growth up to 21% p.a.

Changing Demand Equation

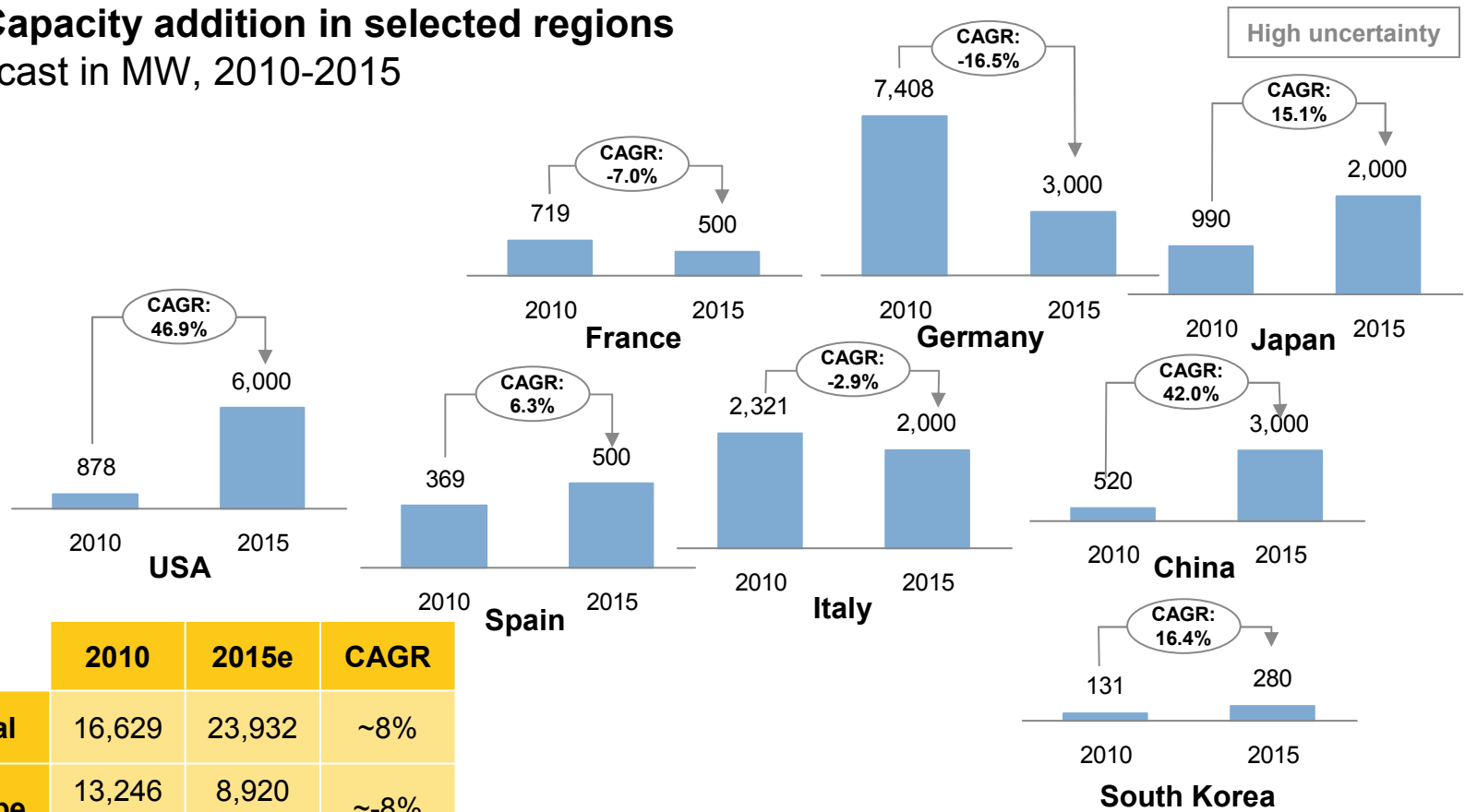
- 1 Substantial regional shifts
- 2 Changing customer mix
- 3 Price / cost pressure
- 4 Technology / Innovation

Substantial regional shifts

Until 2015, major growth will come from the US, China and other Asian markets and Europe's capacity will fall from 80% to 40% of global total

PV Capacity addition in selected regions

Forecast in MW, 2010-2015



	2010	2015e	CAGR
Global	16,629	23,932	~8%
Europe	13,246 [80%]	8,920 [37%]	~-8%
Other	3,383 [20%]	15,012 [63%]	~35%

Source: EPIA May 2011, Oliver Wyman analysis

Changing customer mix

As the regional mix changes, the segments driving PV customer demand will change substantially

Business Type driving customer demand

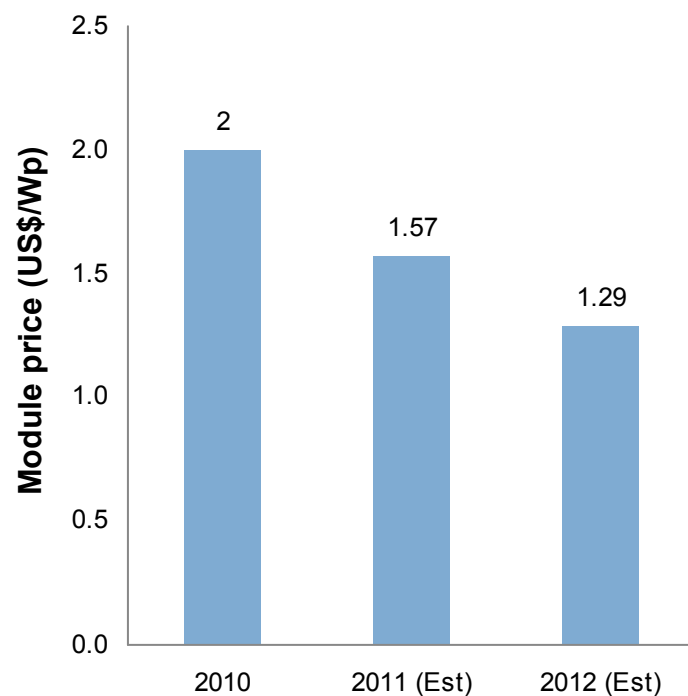
	Residential Rooftops	Commercial Rooftops	Large Scale Open Space
Germany			
Italy			
Spain			
France			
US			
Japan			
China			

Source: EUPD Research, expert interviews, Oliver Wyman estimates

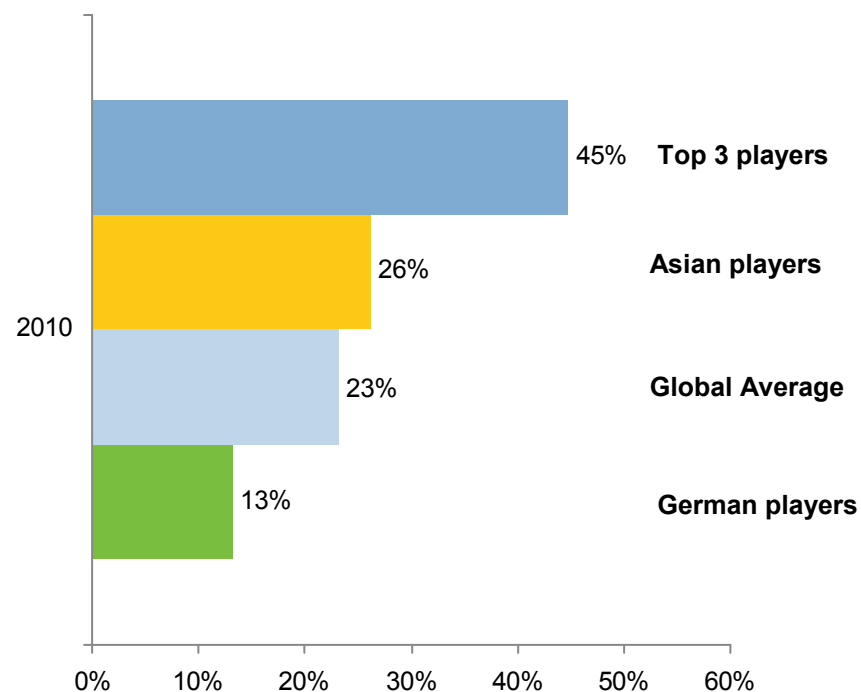
Price/Cost Pressure

Rapid growth has led to the commoditization of PV and causes significant differences in gross-margin

Evolution of solar module price



2010 Gross-margin (% Revenues)

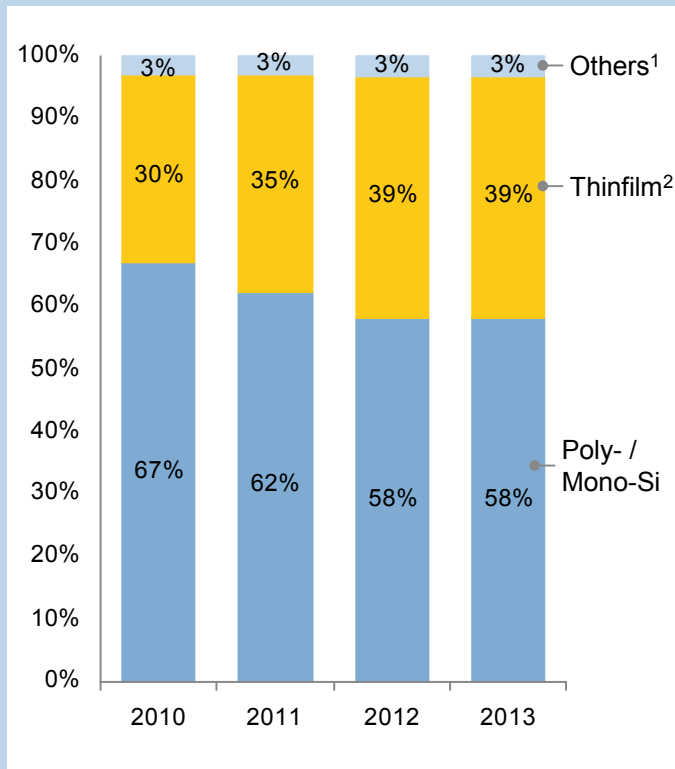


Source: Goldman Sachs Research estimates, Thomson Financial

Technology/Innovation

Innovation will continue; Current technology will be optimized for costs, but new high-efficiency technology may also enter in the near future

Capacity Development by technology 2010-2013



New technologies / solutions [examples]



- Organic based photovoltaic



- High-efficiency thin film technology



- Thin-Fab
- A-Si / μ -Si



- [CIGS] based thin film techn. for high efficiency cells



- High-efficiency mono-crystalline silicon solar cells

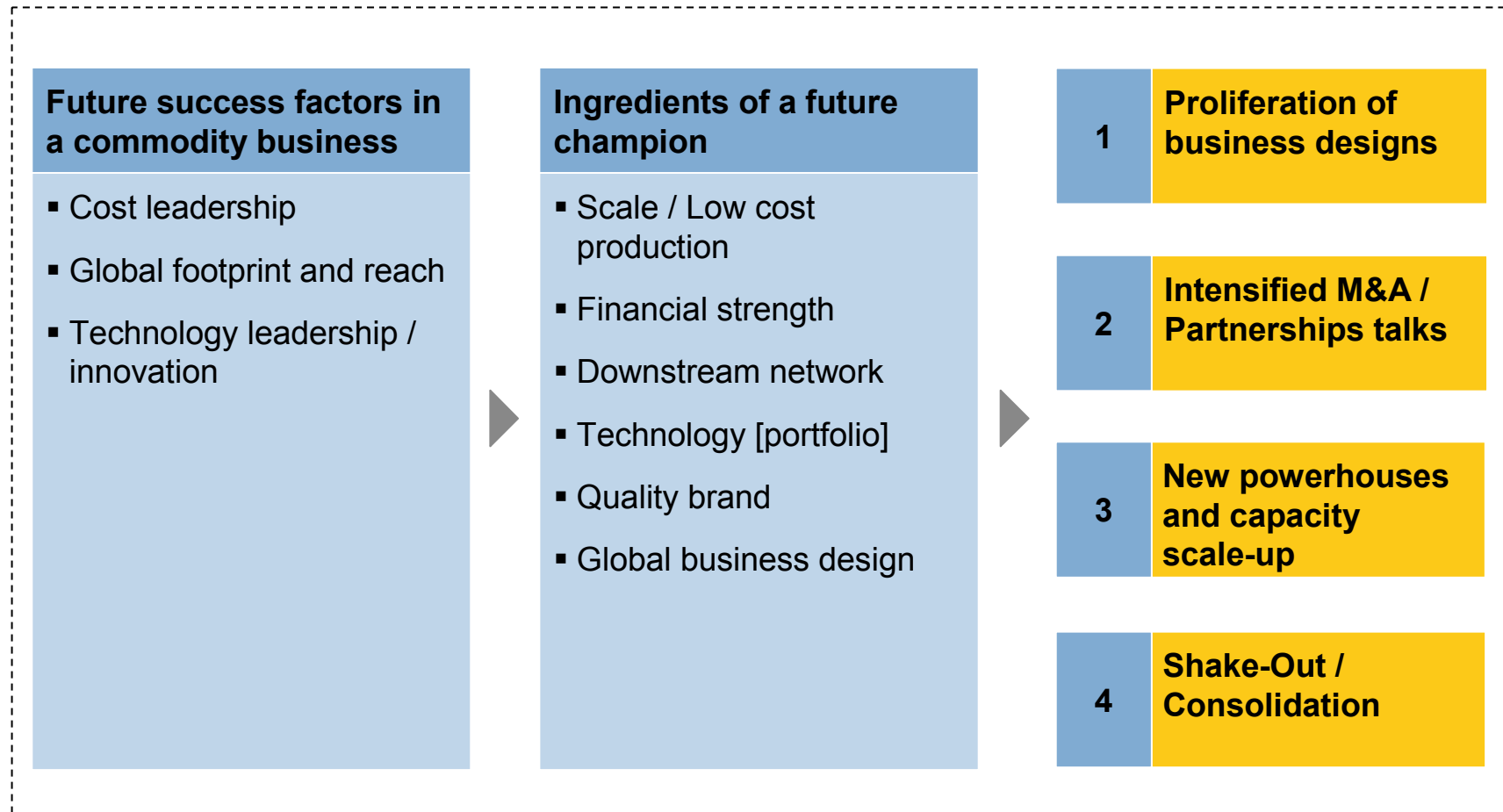
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1 Incl. Thin Silicon Wafers, III-V 2 incl. CdTe, a-Si, a-Si/ μ -Si, CIGS
Source: Yole Development PV Fab Database 2010, Oliver Wyman

Implications of the industry future to PV manufacturers

There will be substantial changes in business designs required to meet future requirements

Perspective of a manufacturer

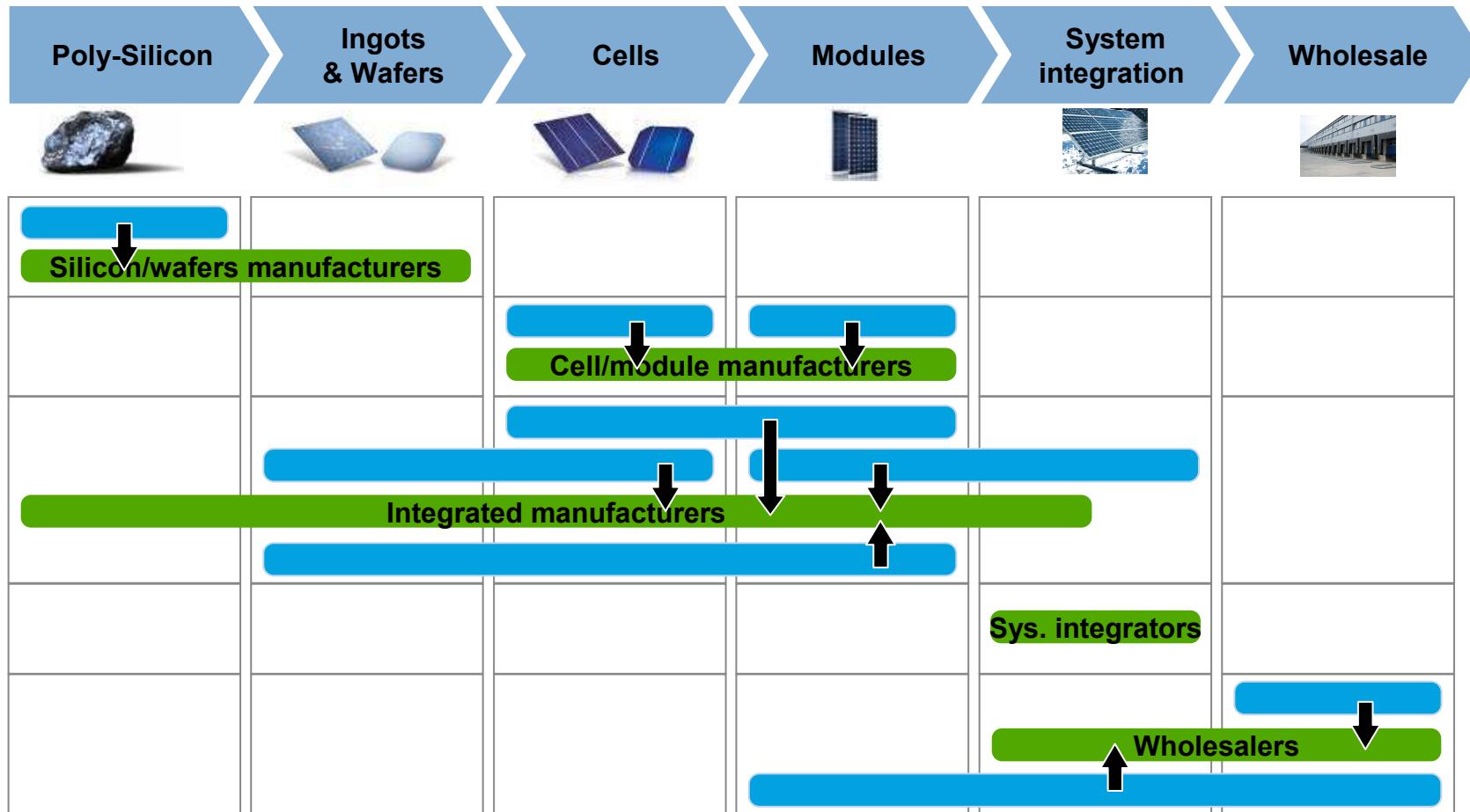


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The Survivors: Winning PV business models by 2012

We expect greater integration across the value chain as companies attempt to capture higher margins

Business model trends of integrated module manufacturers



Source: Oliver Wyman

■ Current business model

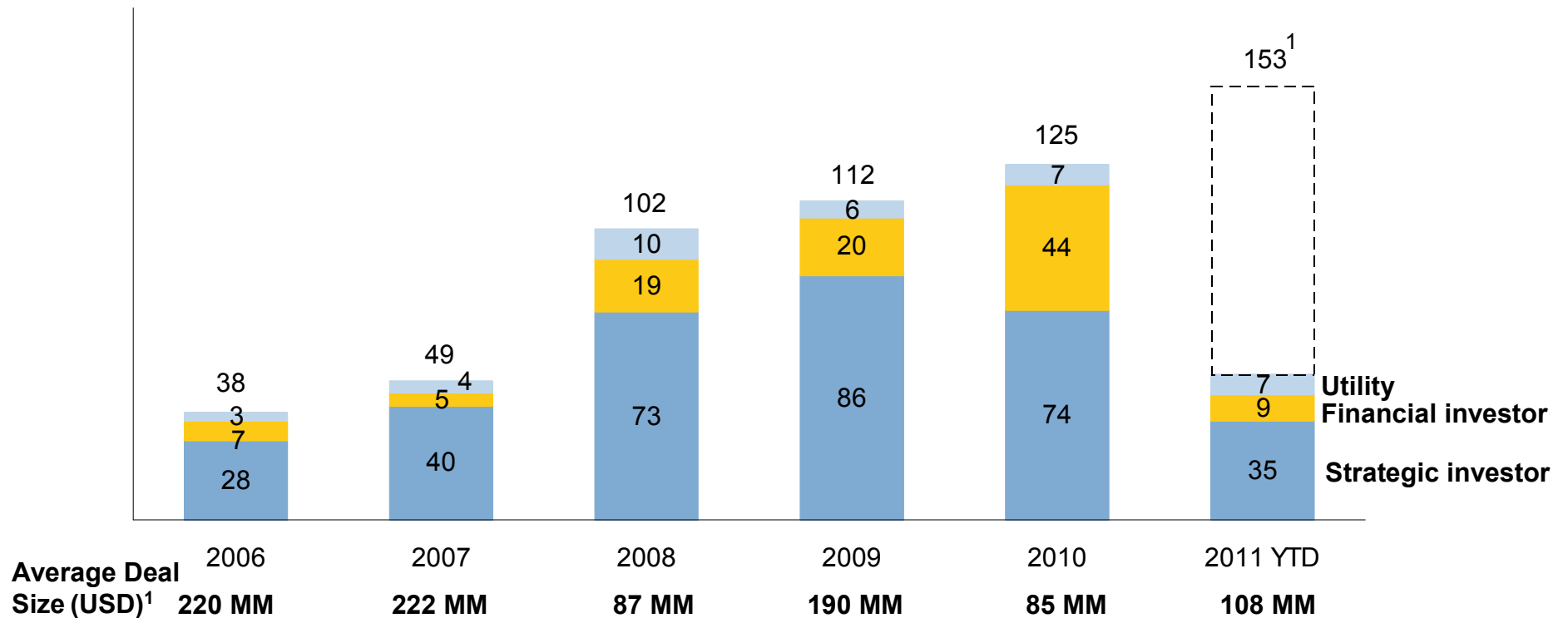
■ Surviving business model

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The solar M&A wave

Mergers and acquisitions have continued in spite of recession, and activity is still growing

M&A Photovoltaic Industry – Number of deals by investor type
2006-2011



Source: Dealogic

1. Estimated total for 2011 based on 51 deals in first 4 months multiplied by 3

3

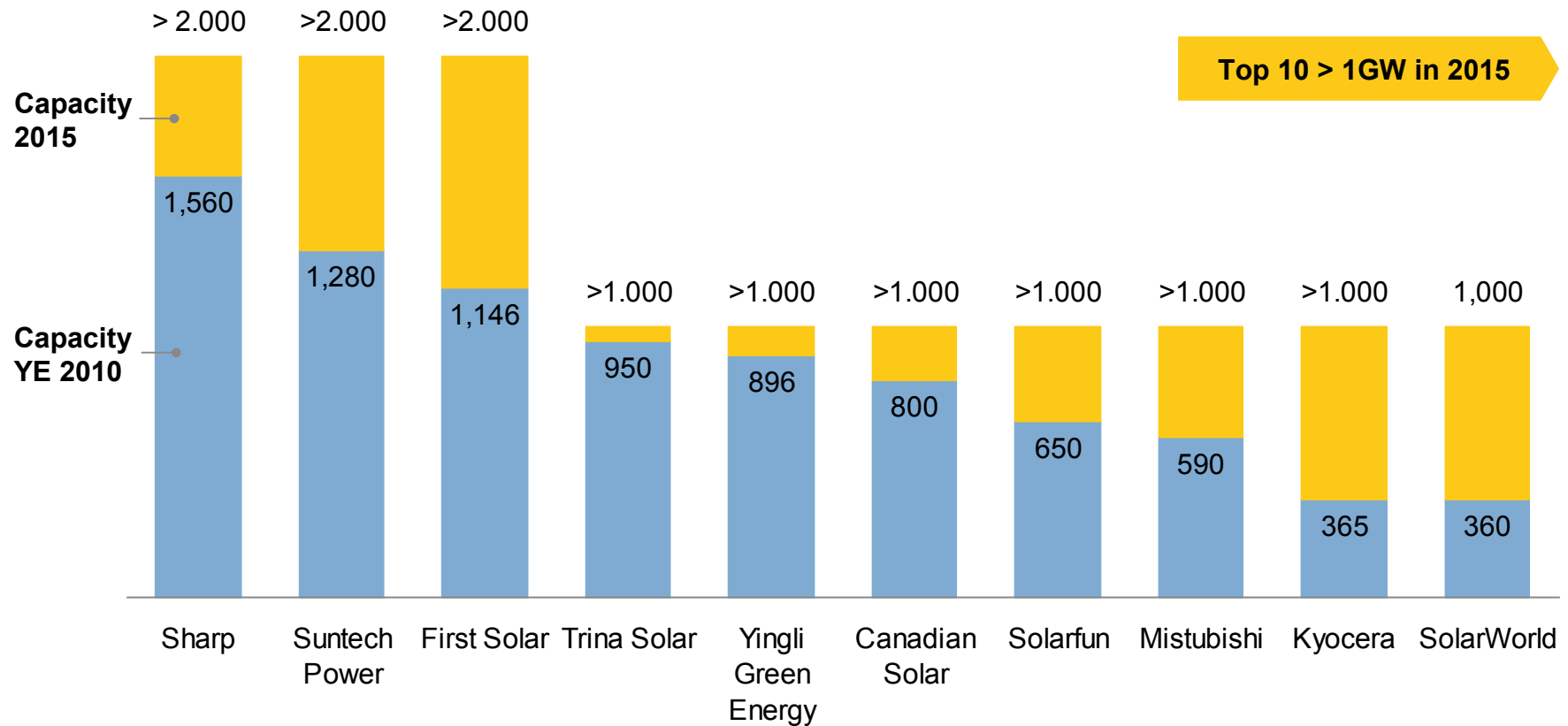
New powerhouses and scale-up

Ramp-up of production capacity by new powerhouses could push smaller players out of the market

2015 module production in-house capacity and plan / stated objective

Selection, in MWp

Indicative



Source: Yole Development PV Fab Database 2010 Press

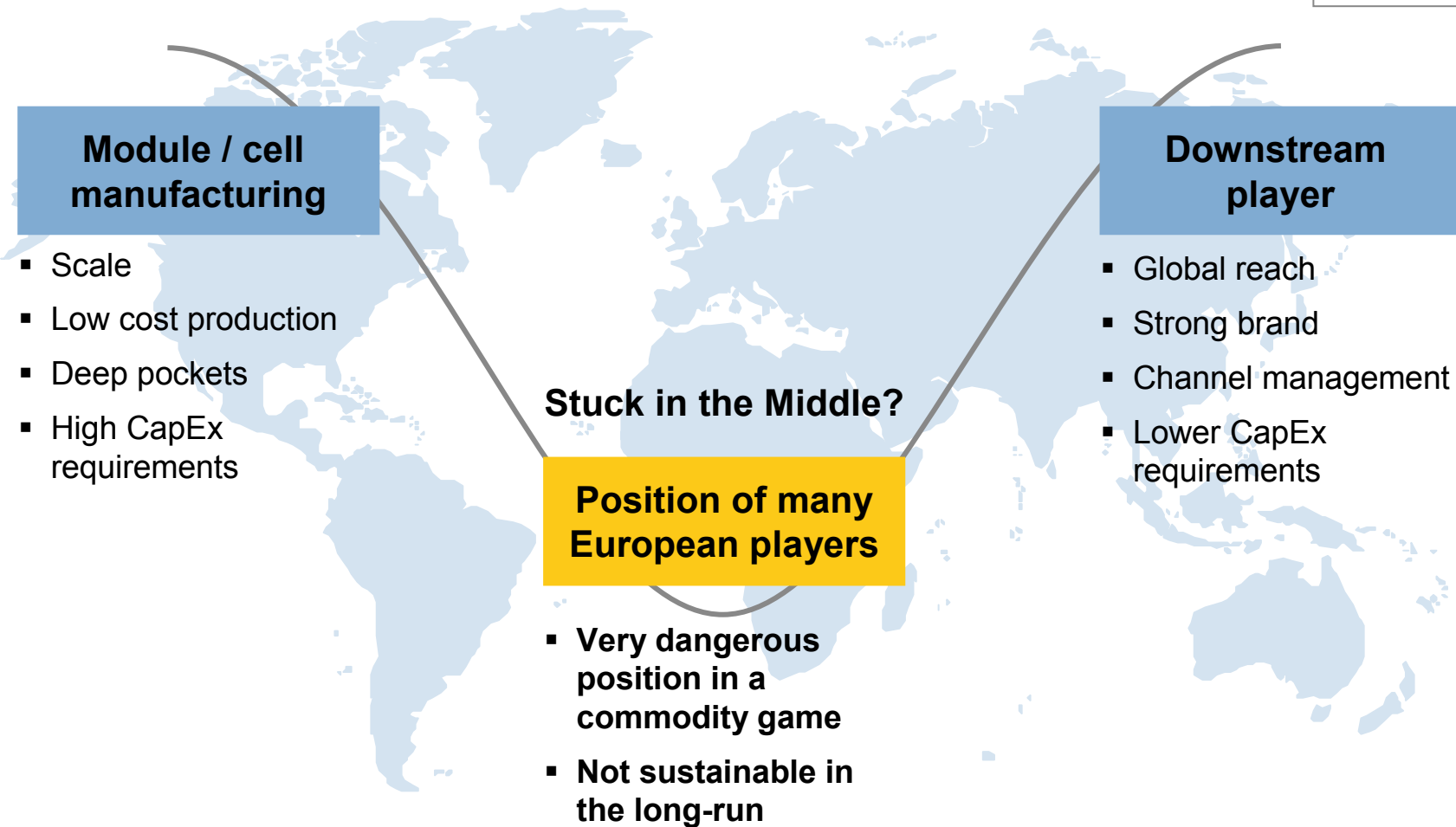
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Shake-out / consolidation

Many existing players will need to review and fundamentally adjust their strategy and business design to get out of unprofitable positions

Strategic dilemma of many European players

Illustrative





Summary

Outlook

- Significant growth expected around the globe, with European focused growth till now to be eclipsed by US and Asian growth in the near term
- Business models with attractive margins are developing, but will be accompanied by tough global competition
- Consolidation expected on the supplier side, with major powerhouses to be established by 2015
- Asian manufacturers have gained cost and scale advantages and are poised to overtake older European players

Before investing...

- Examine the solar industry's widening gap in profitability and consider each company's broader value chain and cash-flow
- Closely scrutinize future business models
- Approach market with portfolio perspective rather than single stock cherry-picking

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