

# PV Survival Guide

How German PV players can survive the global industry consolidation



April 2012

# Introduction

## For German PV companies 2012 is the year to act – industry consolidation will change the PV ecosystem

### Consolidation in German PV Industry has started

With about 65% market growth, 2011 was another record year for the PV industry. However, records have also been reached in terms of **overcapacities**, **price decline** and **inventory levels** along the value chain. The industry reported rapidly **decreasing margins** and first companies have fallen victims to the increased competition. Thus, **temporary work** as well as the number of **production stops** and even **insolvencies** have increased.

Sobering news like the filing for insolvency of Solon AG, Solarhybrid AG and Q-Cells AG and the takeover of Sunways AG by LDK are only **forerunners** of a **global PV shakeout**. This has long been foreseen (cf. goetzpartners Renewables II study, 2009) but especially German companies have **benefitted from unexpected market growth** in Germany and nearby countries like Italy. Together, both markets accounted for about **50% of global demand** in 2011.

**German players** now stand with the **back to the wall** as SolarWorld's anti-dumping claim in the US shows – they won the case but the imposed duties won't change anything fundamentally. The **cost race will continue**.

### 2012 is the year to act!

In **2012**, German PV companies will have to **act**: Both **Germany** and **Italy** have **cut feed in tariffs** beginning of 2012, **Spain** announced a **moratorium** for all renewables, and no other European country will be able to fill the gap. Market **growth** will be driven especially by the **US, China** and further Asian markets.

Overcapacities are expected to increase, with prices continuing to drop, albeit not in 2011's dimensions. Thus, **German PV companies** will be fully affected by the challenging market conditions in 2012 leading to tremendous changes within the German PV ecosystem. To **survive** the **consolidation** companies will have to **act now**.

**goetzpartners** has analyzed the consolidation pressure within the German PV industry along the value chain and identified **eight fields of action to improve the chance of survival**.

Sincerely,



A handwritten signature in blue ink, appearing to be 'M. Sanktjohanser'.

M. Sanktjohanser



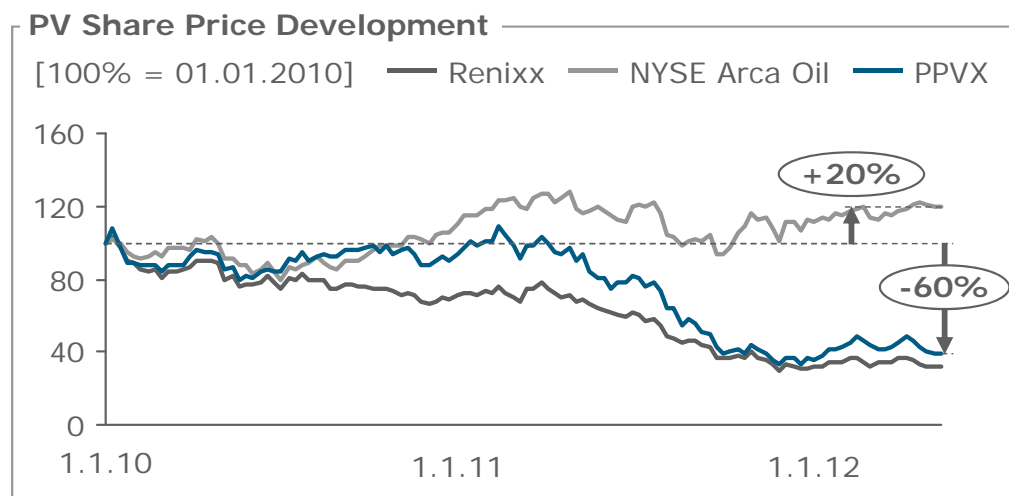
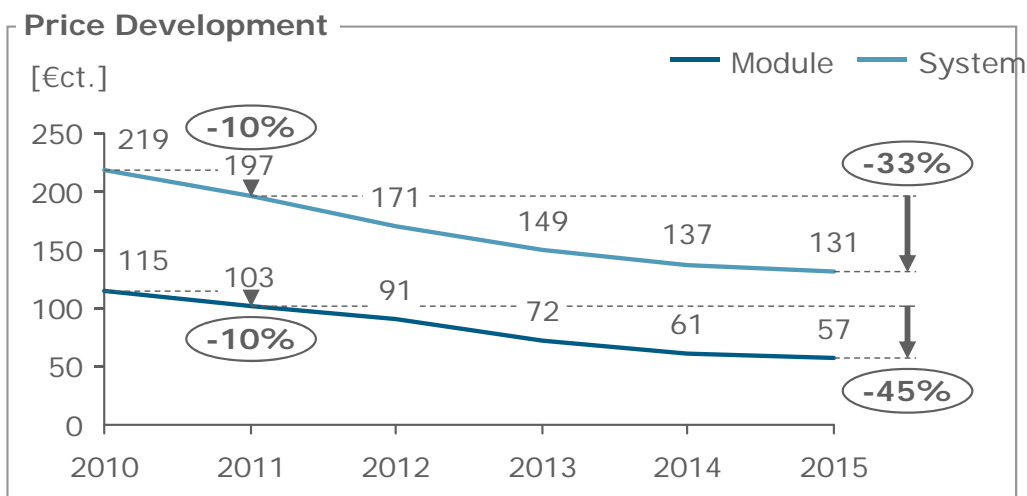
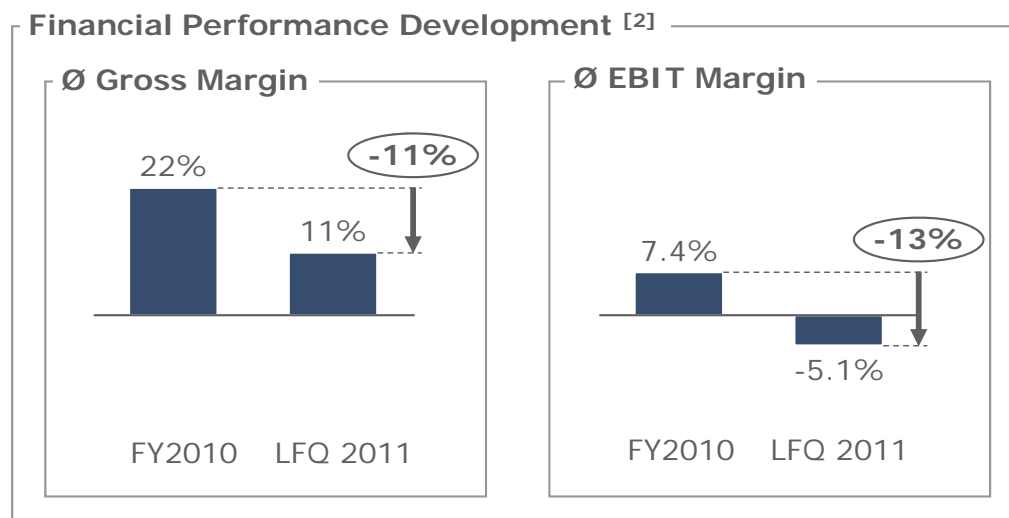
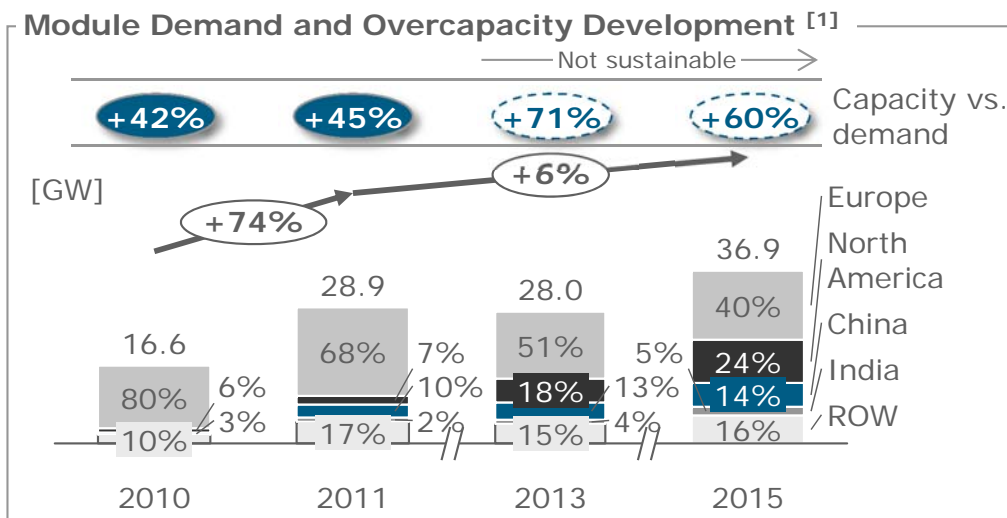
A handwritten signature in blue ink, appearing to be 'S. Olbert'.

S. Olbert

Many thanks to the consultants Philipp v. Stietenron and Sebastian Koch for their efforts during the preparation of this study

# Recent Development of PV Industry

PV gold rush is over – global shakeout of PV players to accelerate



[1] Currently announced module capacities not considering impact of consolidation; [2] Sample: 109 public listed PV companies, LQO last available fiscal quarter;  
 Source: Solarbuzz, Thomson One, IWR, Photon PPVX Index, company information, goetzpartners

# goetzpartners Survival Tool Kit for the PV Industry

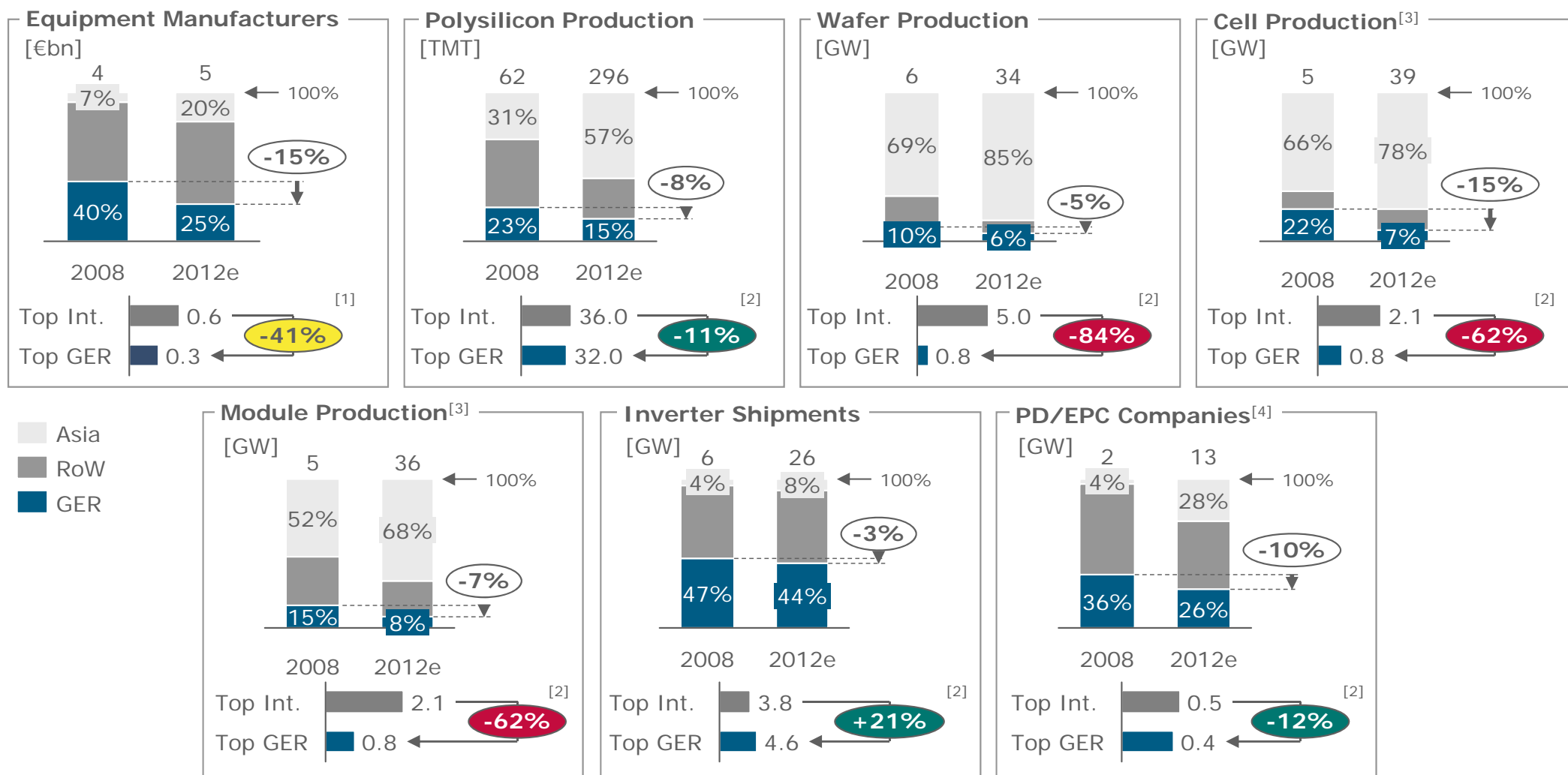
goetzpartners identified 8 action fields to be addressed in 2012 with different emphasis depending on value chain position and business model to increase survival probability within the consolidation



Source: goetzpartners analysis

# Status Quo: Share of German PV Players in Global Production

Across the value chain German PV players are losing ground, especially as Asian players grow quickly



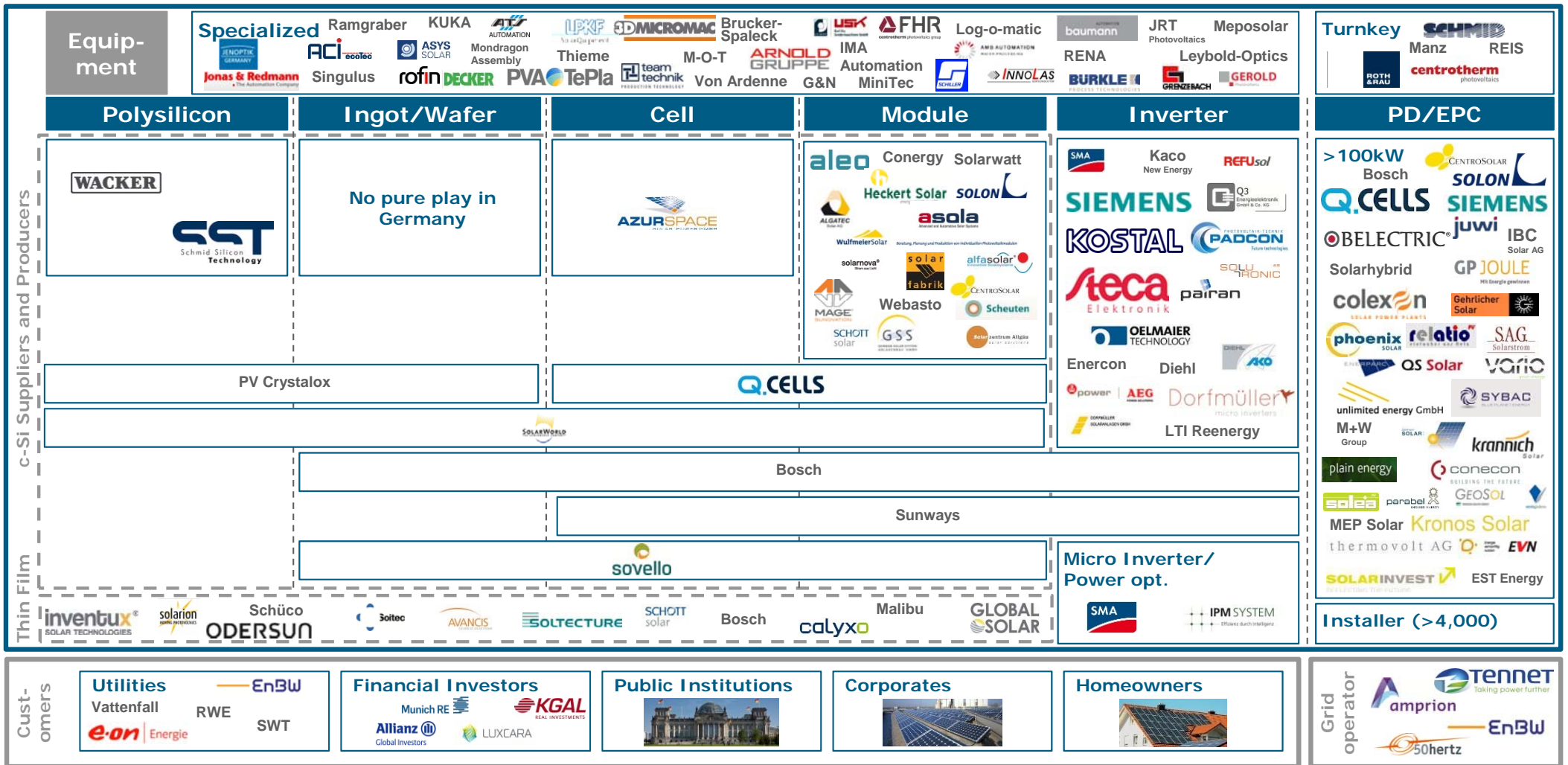
[1] Revenues 2011; [2] Production 2011(e); [3] incl. thin-film modules (2008 = 0.6 GW; 2012 = 5.2 GW); [4] >100 KW

Source: Company reports, Photon 2012, IMF 2011, goetzpartners analysis

Figures might not sum up to 100% due to rounding differences

# German PV Ecosystem

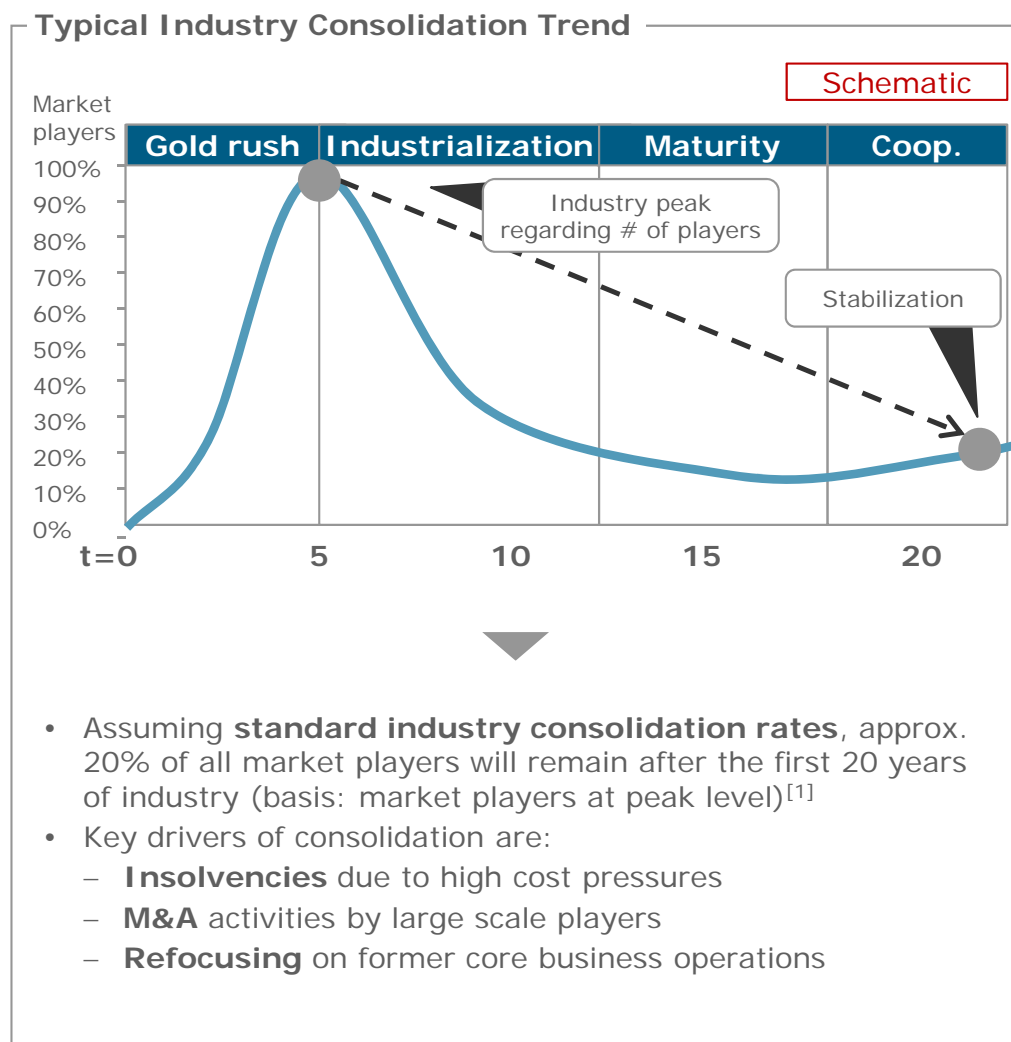
German PV players cover the entire PV value chain – But who will survive?



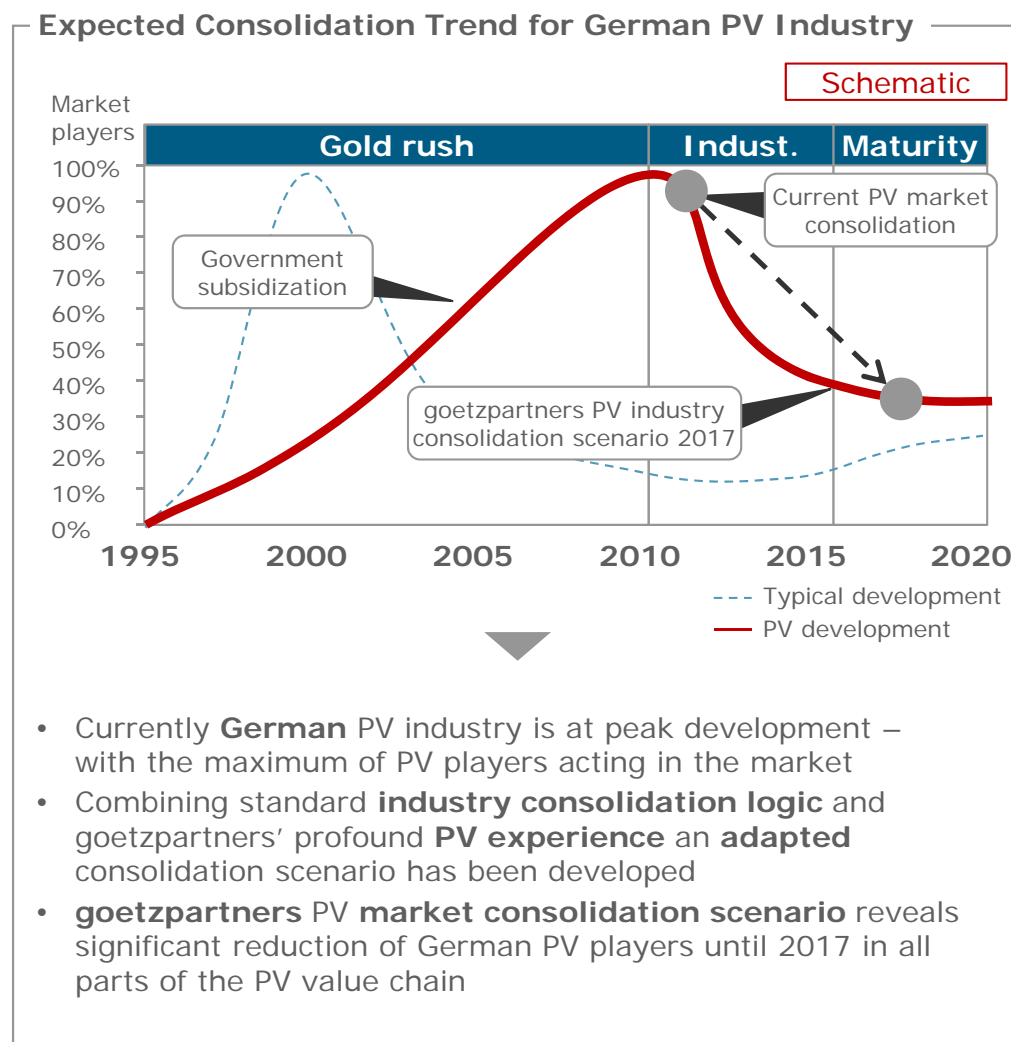
Source: goetzpartners analysis

# goetzpartners German PV Industry Consolidation Logic

The German PV industry will undergo significant consolidation within the next years

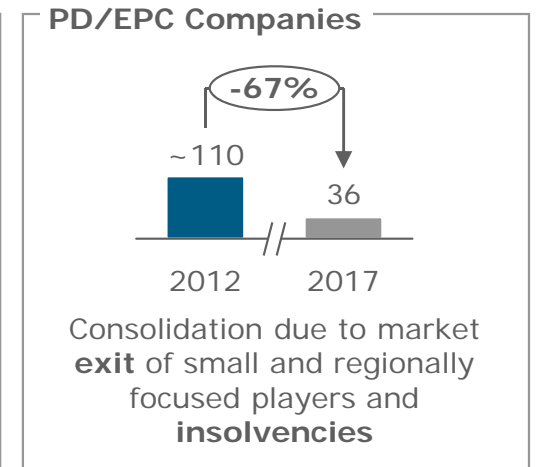
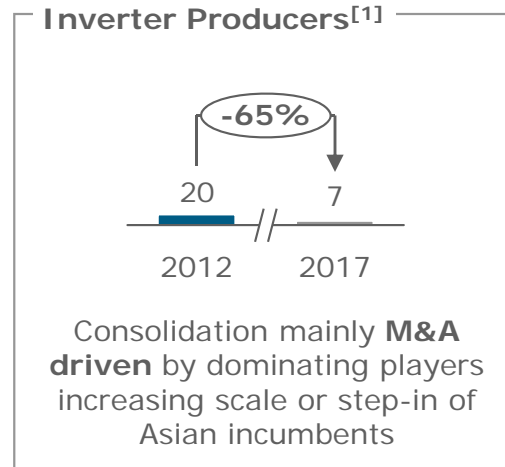
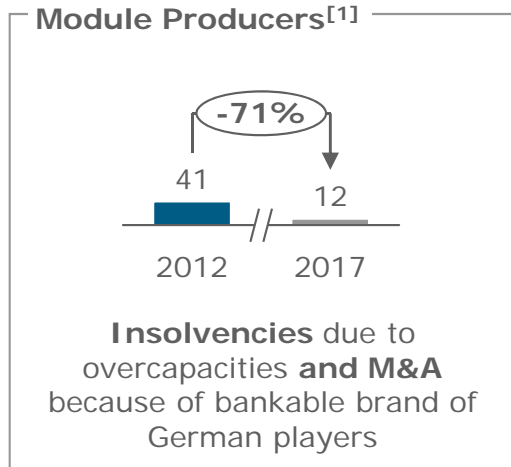
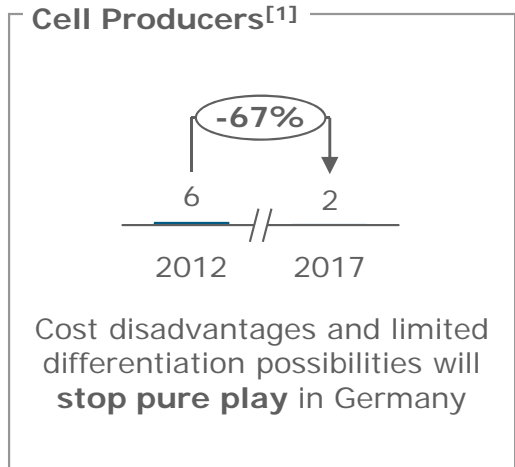
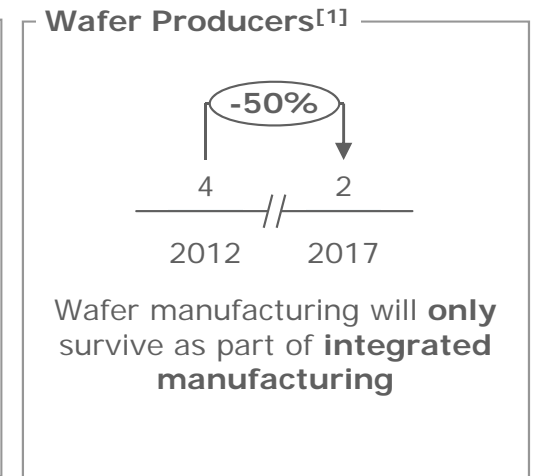
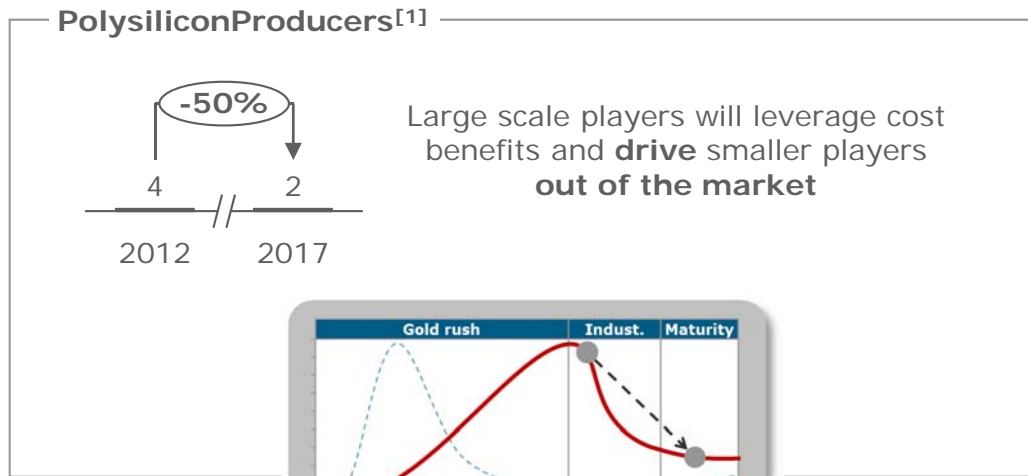
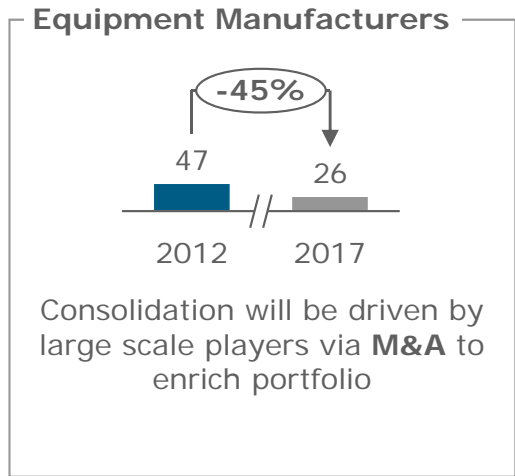


[1] Deans/Kroeger/Zeisel: Merger Endgame  
Source: goetzpartners analysis



# goetzpartners German PV Industry Consolidation Scenario 2012-2017

Overall, only 37% of Germany's current PV players are expected to survive in the PV market until 2017



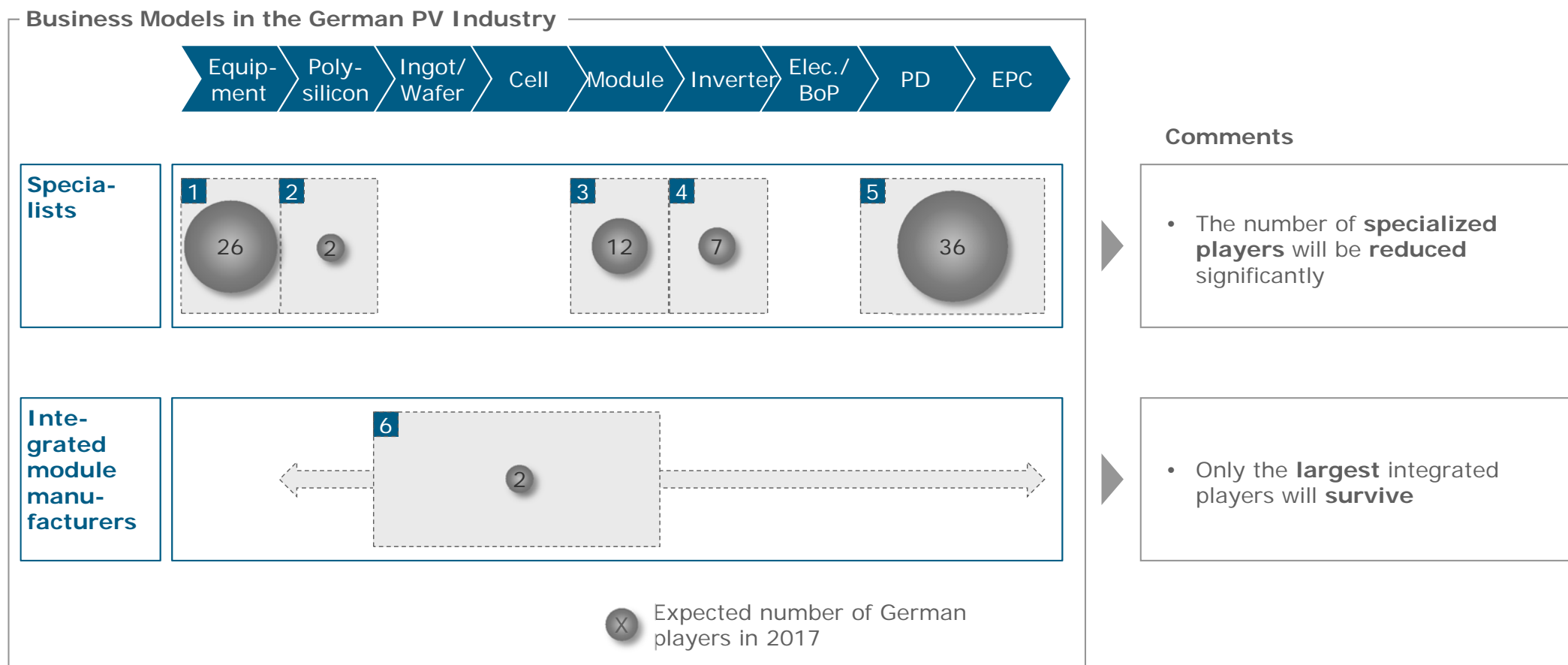
2012 as of 02/2012 [1] Integrated players counted in each value chain segment once to allow for simulated shut down of specific operations

Source: goetzpartners analysis



# German PV Industry 2017 – Post Consolidation Result

6 business models will be applied in 2017 with varying numbers of players within each of them



► **What is required to survive and to be among the winners?**

# Equipment Manufacturer

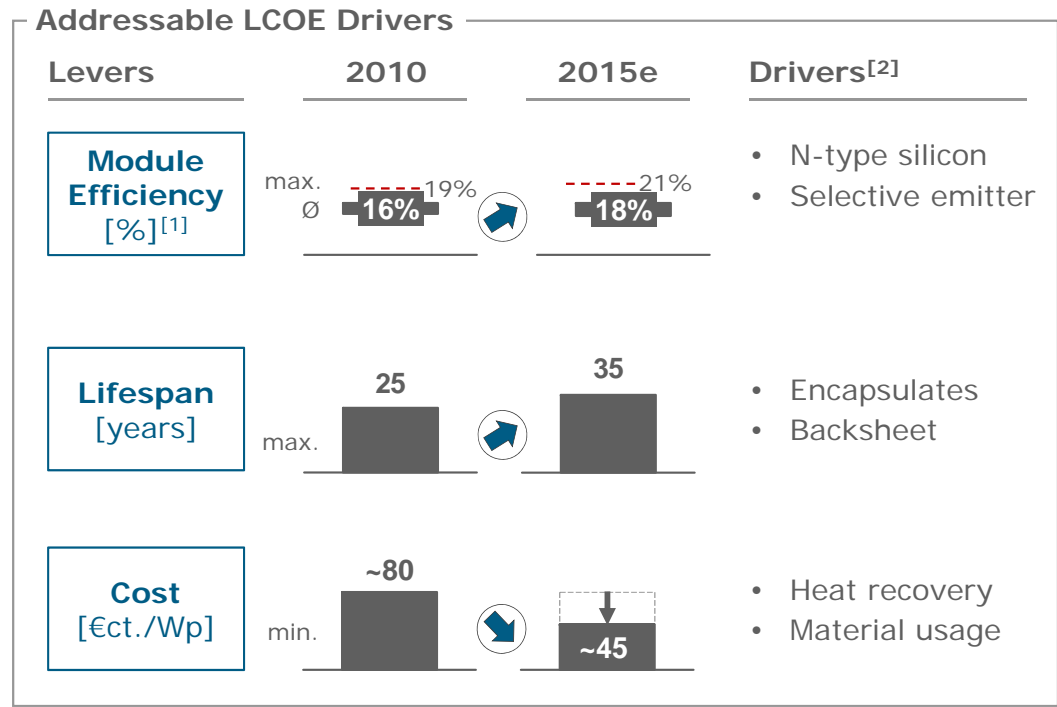
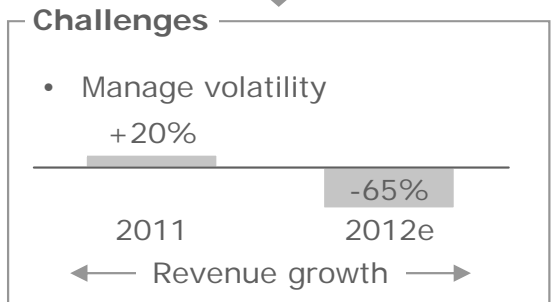
**1** Technological leadership is the elixir - Diversification into new markets and offering of upgrades on sold equipment is key to manage volatile demand & overcapacities

**Survival rate 2017** **55%**



**Focus: Technology**

- **Technical innovation** as main driver
- **Half value period** of innovations approx. 2-3y
- Constant **improvement & innovation leadership** as must have to cope with **cost pressure** on system cost level
- To stay competitive:
  - Constant R&D investments
  - Partnerships



**Success Factors**

- Diversification**: Diversify into related industries like displays and semiconductor industry
- Equipment upgrades**: Focus on equipment upgrades during times of overcapacity

[1] Sunpower 2011, based on c-Si technology [2] non exhaustive  
Source: IMS research, goetzpartners analysis

Highly important Less important

# Polysilicon Manufacturer

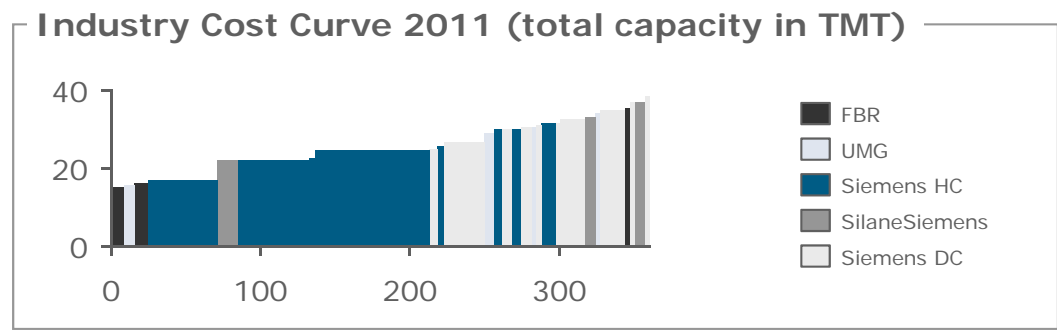
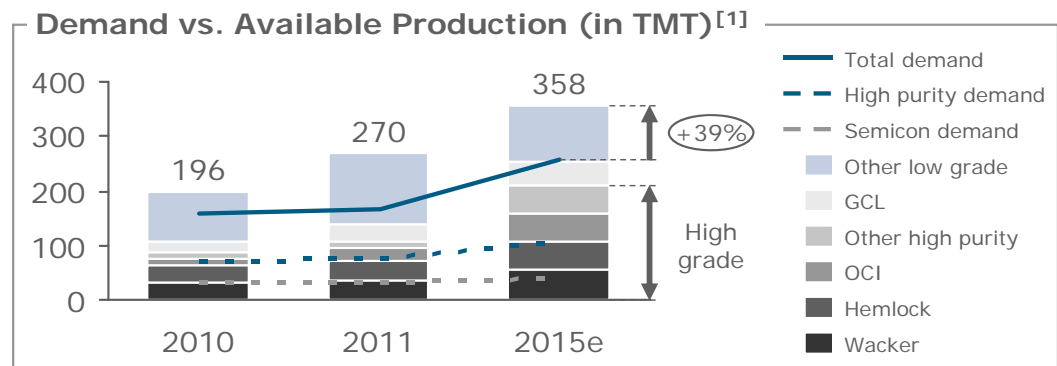
**2** Paradigm shift in polysilicon market requires rapid cost reduction while offering high grade products at big volumes – CAPEX management is key

**Survival rate 2017** **50%**



**Focus: Efficiency**

- **Paradigm shift** in former polysilicon oligopoly
- Total manufacturing cost of **<20 \$/kg** necessary
- **New technologies and optimized processes** required to increase yield, throughput and to decrease cost, e.g.:
  - **Larger reactors:** From 600 to >1000 MT/a per reactor
  - **Conversion efficiency**
  - **Energy efficiency**



**Challenges**

- **CAPEX requirements**
- Rapid **price decline**
- **Asian** competitors with very **low financing cost**

**Success Factors**

- 10N+ purity**
  - Capability to produce **high purity** polysilicon for >20% cell efficiencies
- Low CAPEX technology**
  - Technology with **low scale-up CAPEX** requirements

[1] Consolidation scenario with significant reduction of overcapacities in Asia and shut down of low grade – small scale operations  
 Source: Company information, GTM research, goetzpartners Polysilicon Market Model, goetzpartners analysis

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# Module Manufacturer (c-Si)

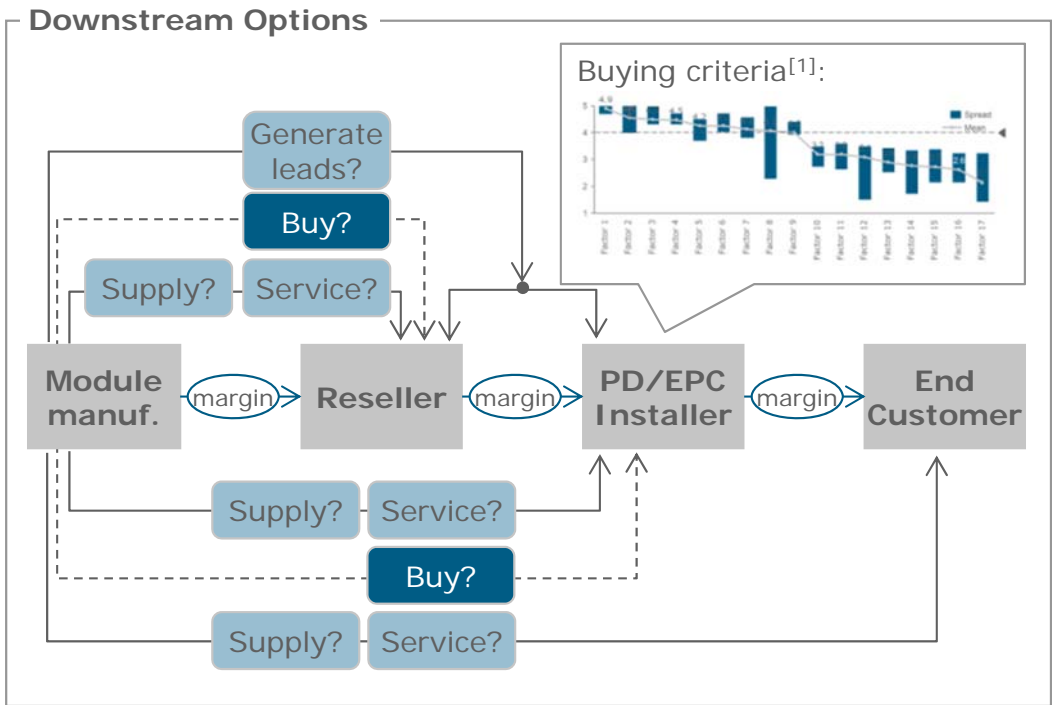
**3** Direct sales of bankable products to end customers offering high quality services required to survive as independent c-Si module producer

**Survival rate 2017** **29%**



**Focus: Sales Excellence**

- **Active sales** required to get **direct access** to projects, sales channels and end customers
- **Different options** have to be **evaluated**, e.g.:
  - Direct vs. indirect sales
  - Multi vs. single channel
  - Own PD/EPC business vs. partnering
  - Organic vs. inorganic growth



**Challenges**

- **Overcapacities** driven by Asian players
- **Cannibalization effects** in multi channel sales
- **Contract manufacturing**

**Success Factors**

- Service offering**
- High **quality** of service offering including **financing services**, replacement services etc. (e.g. bundled in partner programs)
- Bankability**
- High **perceived quality** of products and high **reliability**

[1] goetzpartners survey among 250 installers in Germany, goetzpartners database of >3,000 installers  
Source: goetzpartners analysis

Highly important Less important

# Module Manufacturer (thin film)

**3** Compared to their c-Si rivals, thin film manufacturers need to increase efficiency, enter project development more actively, and to innovate faster

**Survival rate 2017** **29%**

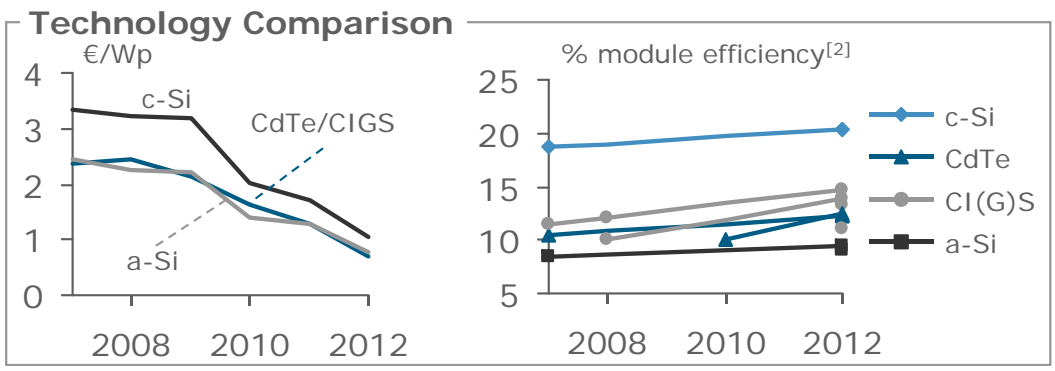
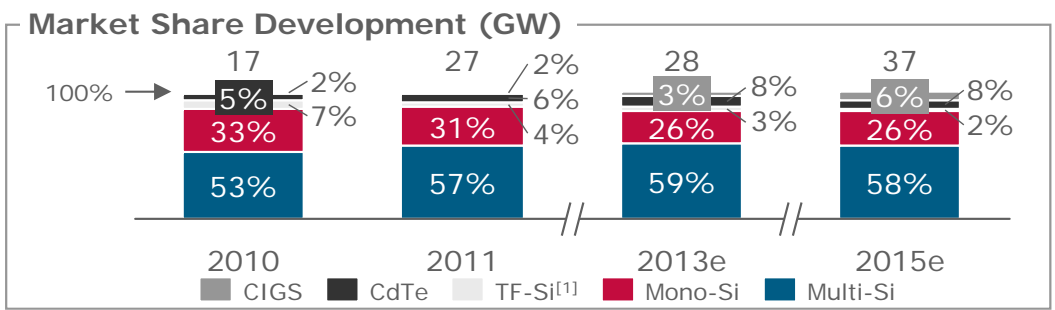


**Focus: Technology**

- **Thin film technologies hardly gain market share** as c-Si cost come down rapidly
- **Especially CI (G)S** expected to be **competitive** with c-Si in the long run
- **Low CAPEX** CI(G)S technology (no vacuum) required with **high efficiencies**, e.g. printing

**Challenges**

- **Financing of ramp up**
- **Process stability** at commercial scale
- **Bankability**
- **End market access**



**Success Factors**

- Scale-ability**: Modular production concept allowing **rapid ramp up** after proof of concept at low risk
- Product innovation**: Innovative **products for niche markets**, i.e. special designs and application areas

Figures might not sum up to 100% due to rounding differences [1] market share includes CPV [2] Reported by major thin film players Highly important Less important  
 Source: PPVX Spot Market Prices, Solarbuzz, Photon, Analyst Reports, goetzpartners analysis

# Inverter Manufacturers

**4** Future industry leaders need to offer products to all customer segments globally at large scale

**Survival rate 2017** **35%**

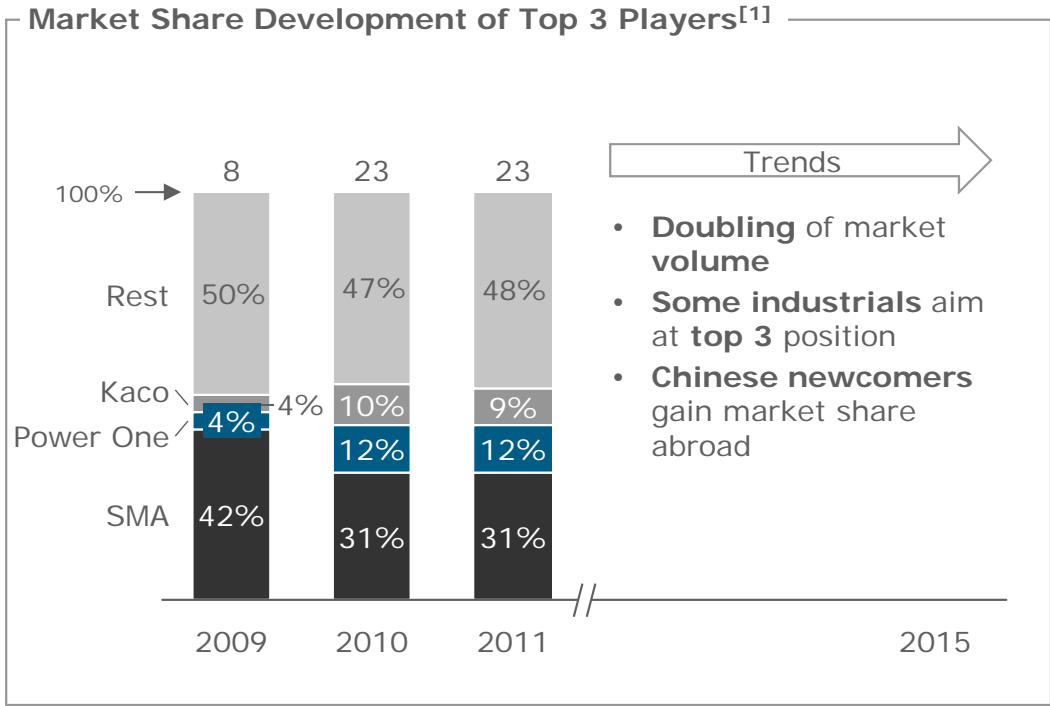


**Focus: Technology**

- Inverter market is driven by **technology** and scale
- Continuous innovation required to **keep competitive advantage** towards Asian competitors, e.g.:
  - Energy management
  - Power optimizer
  - Micro inverter
  - Local grid voltage requirements

**Challenges**

- Increased price pressure
- Competition from Asian players
- Demand volatility



**Success Factors**

- Flexibility**
  - Flexible production and supply chain to be able to balance strong demand volatility
- High Coverage**
  - Coverage of many markets and applications required in order to increase utilization rate (problem for niche players)

Source: IHS iSupply, goetzpartners analysis

● Highly important    ● Less important

# Project Developer and EPC

**5** Global reach with local content, financial power to gain project access, and project execution capabilities become increasingly important to secure business success **Survival rate 2017** **33%**

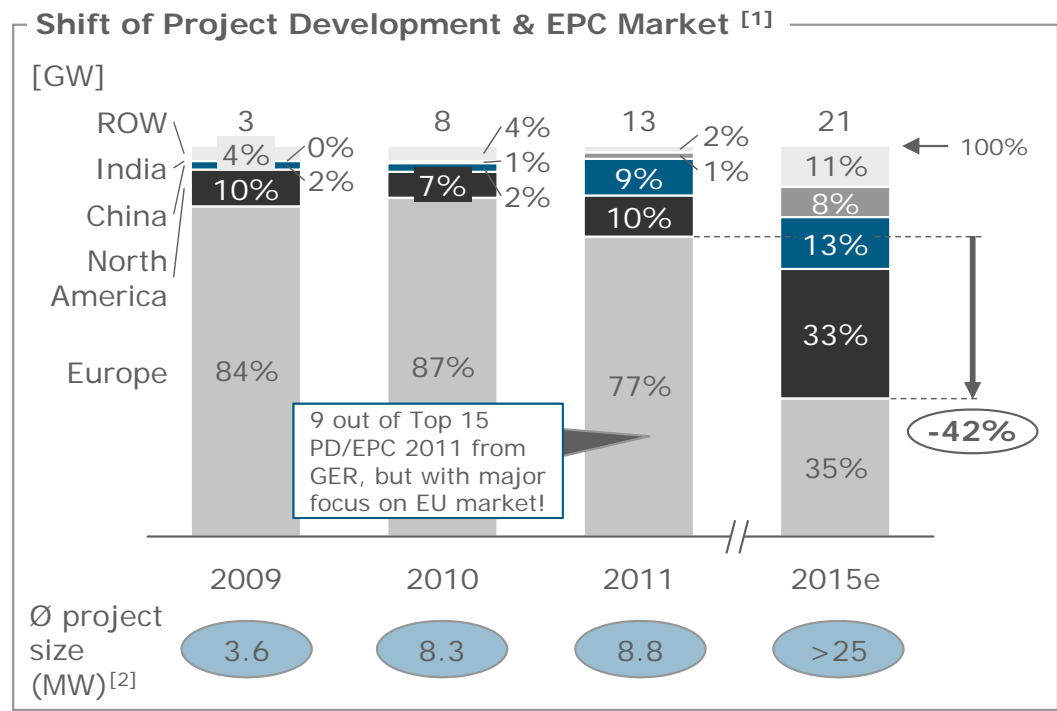


**Focus: Global Presence**

- Market shift requires PD/EPC players to manage projects on a **global scale**
- Global project execution skills necessary – esp. concerning **project supply chain mgmt.**
- Degree of localization** of business model needs to be adjusted/optimized

**Challenges**

- Increasing **project size**
- Pre-financing** requirements increase
- Risk management** necessary due to market shifts and project delays



**Success Factors**

- Local content**: Find **partners** or set up **JVs** for **new markets** or **along value chain** to reduce risk profile and **secure local content**
- Access to resources**: Access to **qualified resources** in all countries of presence

[1] Projects > 100 kW [2] Projects > 500 kW  
Source: IMS Research, NEF, goetzpartners analysis

Highly important Less important

# Integrated Module Manufacturing

**6** Margin staking along VC<sup>[1]</sup> requires CAPEX and R&D capabilities on each VC<sup>[1]</sup>-step - integration to end customers is essential to secure outlet for produced volumes

**Survival rate 2017 66%**

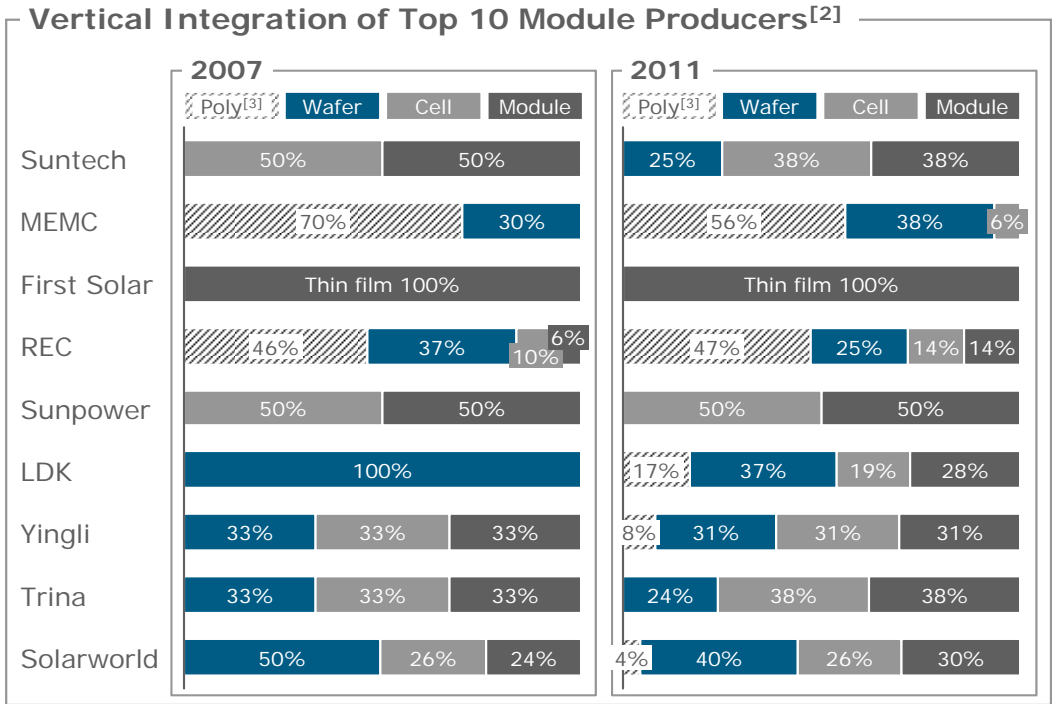


**Focus: Integration**

- **Upstream integration** up to **polysilicon questionable** as poly prices have declined rapidly ⇔ high grade poly supply to be secured
- **Cost competitiveness** on all stages required
- **Downstream integration** will **gain importance** as own sales channel:
  - Access to projects via financing services and/or own PD/EPC business
  - Access to installers

**Challenges**

- **Technological** variety
- **Low cost** wafer/cells from Asian specialists
- **Overcapacities**



**Success Factors**

- **Global footprint**
- **Transition from single production hub to global manufacturing footprint**
- **Healthy balance sheet**
- **Mastering of CAPEX and R&D** game along the entire value chain

[1] Value Chain [2] Top 10 by revenue 2011 [3] Assumed 2007: 8.5g/W, 2011: 6.7 g/w  
Source: Company information, goetzpartners analysis

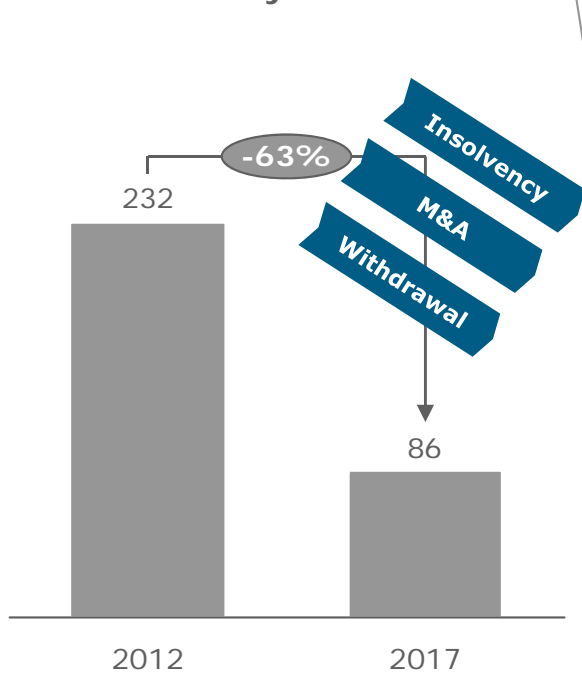
● Highly important ○ Less important



# Summary

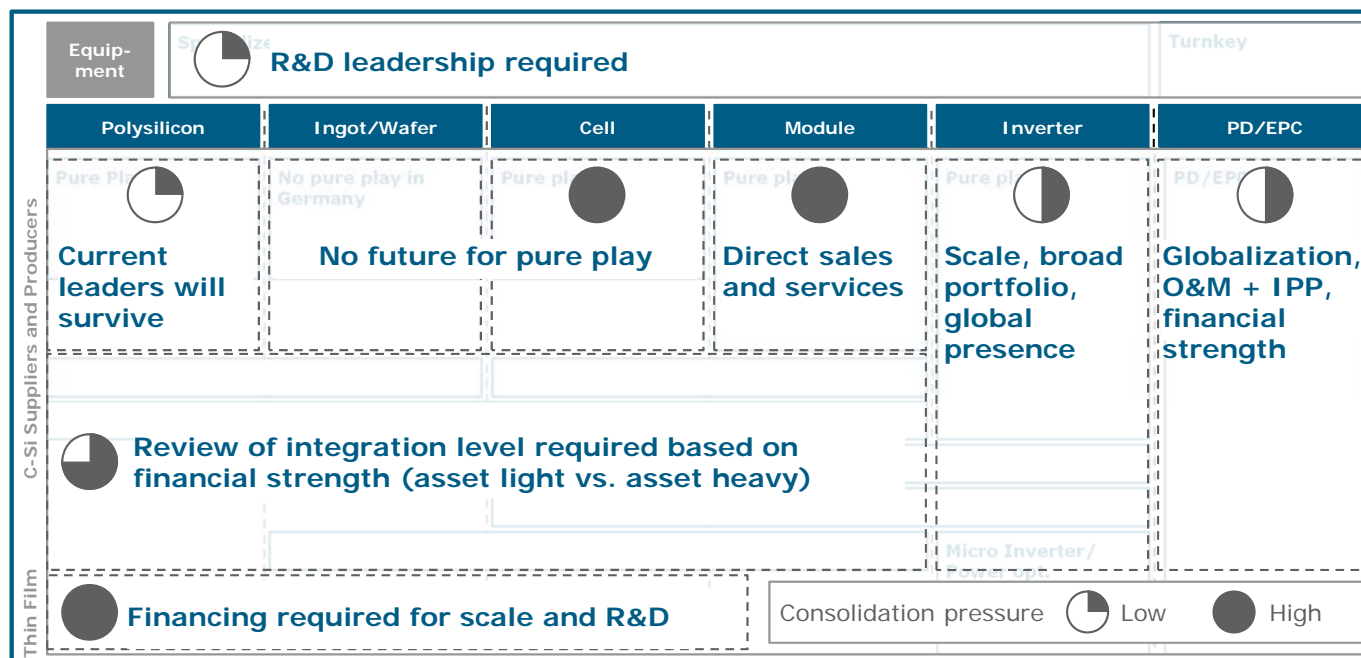
The German PV ecosystem will be significantly reshaped by 2017 losing over 60% of current players – Market entry of leading industrials will bring the industry to the next level

**Expected Consolidation of German PV Players**



- **Consolidation trend** of German PV industry inevitable
- Though, **not all parts** of the PV ecosystem will be hit equally

**Consolidation Pressure Across the German PV Industry Ecosystem**



Increasing competition through Asian players and entry of leading industrials (selection)



- German PV industry will undergo **painful consolidation** wave especially on formerly prospering **cell and module** production level
- Comprehensive **restructuring** programs are **required to stay in the game**
- **Additional business models** like OEM system integrators **will emerge**

● High consolidation pressure    ● Less consolidation pressure

Source: goetzpartners analysis

# About the Authors | goetzpartners' PV Expertise

goetzpartners provides consulting services along the value creation cycle of a company – our clients can rely on many years of project experience in the PV industry

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Michael Sanktjohanser is Managing Director at goetzpartners in Munich and heads the Energy/Utilities Industry Line.

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## Analyst Team

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Sebastian Koch

## goetzpartners PV Project Expertise (selection)

- **Integration** of M&A target

- Development of **PV market entry strategies**

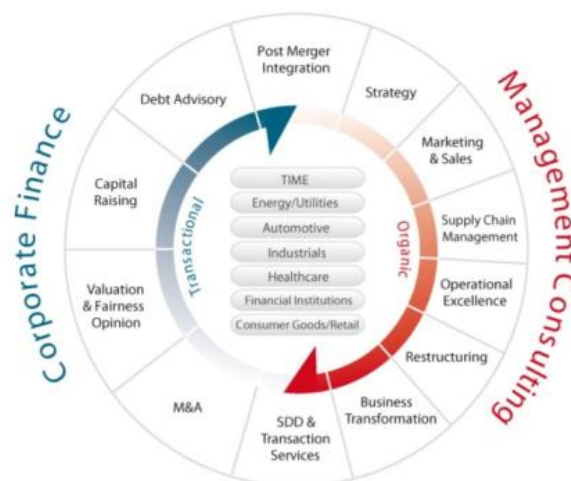
- Development of global **internationalization** strategy
- Development of **downstream** strategy and **partner program**
- **Sales channel** and **customer** analyses

- **Global procurement** optimization for wafer to module production

- **COGS analyses and reporting**
- Product **portfolio** optimization

- **Restructuring** and **turnaround** programs

- Set-up/tracking of global **business transformation** program
- Set-up of **global organization** concept
- Review and optimization of **sales organization**



- **M&A** buy-side advisory

- Poly-Si **CDD**
- Advisor for **JV founding**

## Coverage of PV value chain<sup>[1]</sup>



[1] example for crystalline silicon  
Source: goetzpartners

# About goetzpartners

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goetzpartners is a leading independent European consulting company that combines M&A (mergers & acquisitions) advisory and management consulting under one roof. With this unique service offering goetzpartners advises companies along their whole value chain, thus creating sustainable value for them. The Group is represented with offices in Munich, Düsseldorf, Frankfurt, London, Madrid, Moscow, Paris, Prague, Shanghai and Zurich, and maintains international cooperation ventures.

goetzpartners Management Consultants concentrates mainly on the fields of strategy, operational excellence, and business transformation. goetzpartners Corporate Finance focuses on M&A advisory services. goetzpartners was classed a "Hidden Champion" 2009 in the fields of strategic due diligence, financial and merger strategies as well as post-merger integration (result of the latest "Hidden champion" study carried out by Professor Fink in collaboration with the magazine "Capital").

## Industry Line Energy

goetzpartners accompanies their clients on their way to renewable energy sources and the increase of efficiency, e.g. combined heat and power, decentralization and climate neutral generation from fossil fuels. Based on our integrated approach, our expertise and our deep understanding of business issues we support our clients – integrated utilities, municipalities, independent power producers, financial and infrastructure investors as well technology driven companies – in all strategic, operational and transactional topics.

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