



Financing Innovation and Growth of the PV sector

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Outline



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 - **Role of Seed/VC**
- **The Incubation period**
- **Public support to Innovation**
- **Conclusions**

- The link between Innovation and Growth
 - “it is the application of advances in technology, in conjunction with entrepreneurship and innovative approaches to the creation and delivery of goods and services, which translates scientific and technological advances into more productive economic activity. This results in economic growth if market structures and the regulatory environment enable the more productive activities to expand.”
 - “ This said, the innovative effort itself, including formal research and development, remains the sine qua non of growth.”

Innovation and Growth: rationale for an Innovation Strategy; OECD 2007

Introduction



- **The link between innovation and growth has long since been evident to the science and technology policy community**
- **More suprisingly, it is only since the mid 90s that innovation is high on the economic policy agenda**
- **Despite the importance of innovation, many OECD countries face difficulties in strengthening performance in this area.**
- **Emerging economies, on the contrary, doubled their shares of high technology goods between 1996 and 2004**

Innovation in PV: background



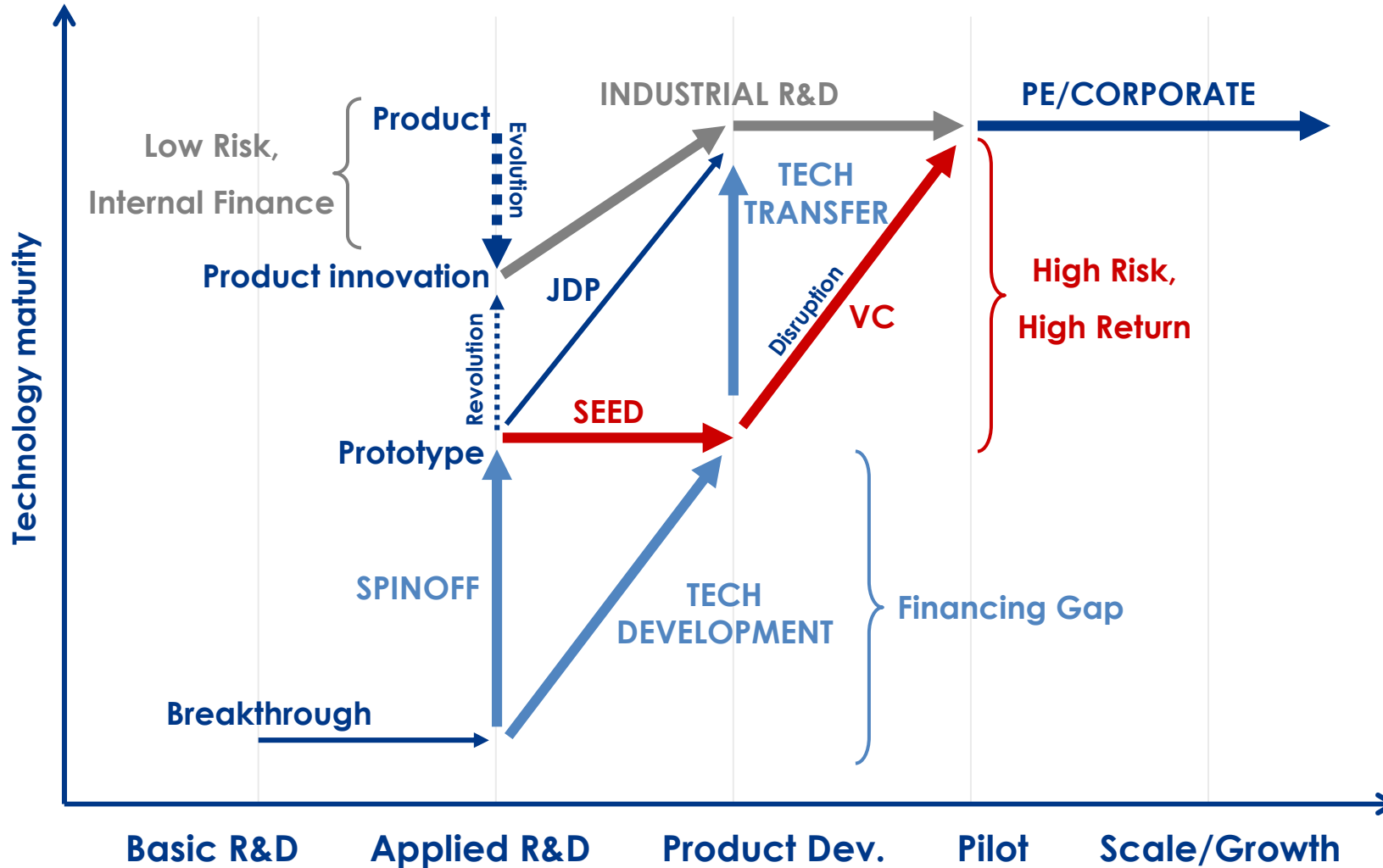
- **1980s: Technology gap between industry and R&D centres; tech transfer hurdle**
- **1990s: First R&D pilot lines for c-Si; Industrial PV cell process technology development**
- **2000s: JDPs in c-Si; switch of R&D centres focus from process development to servicing the industry**
- **2005+: PV Boom**
 - **Significant seed and VC funding made available to thin film and CPV**
 - **Surge of PV consumable supplier and equipment manufacturers as key players in innovation**
 - **c-Si: creation of industrial R&D infrastructure, ,competition‘ with R&D institutes**

Innovation in PV: background

- The innovation cycle in the PV sector has evolved through different forms in time
- Stakeholders have adapted to the milieu rather than governing the process
- There has been growth, but has it been an efficient and sustainable process?
 - c-Si R&D centres to reposition themselves
 - Overfunded TF and CPV ventures to consolidate

Financing Innovation

Routes to innovation



Product Innovation

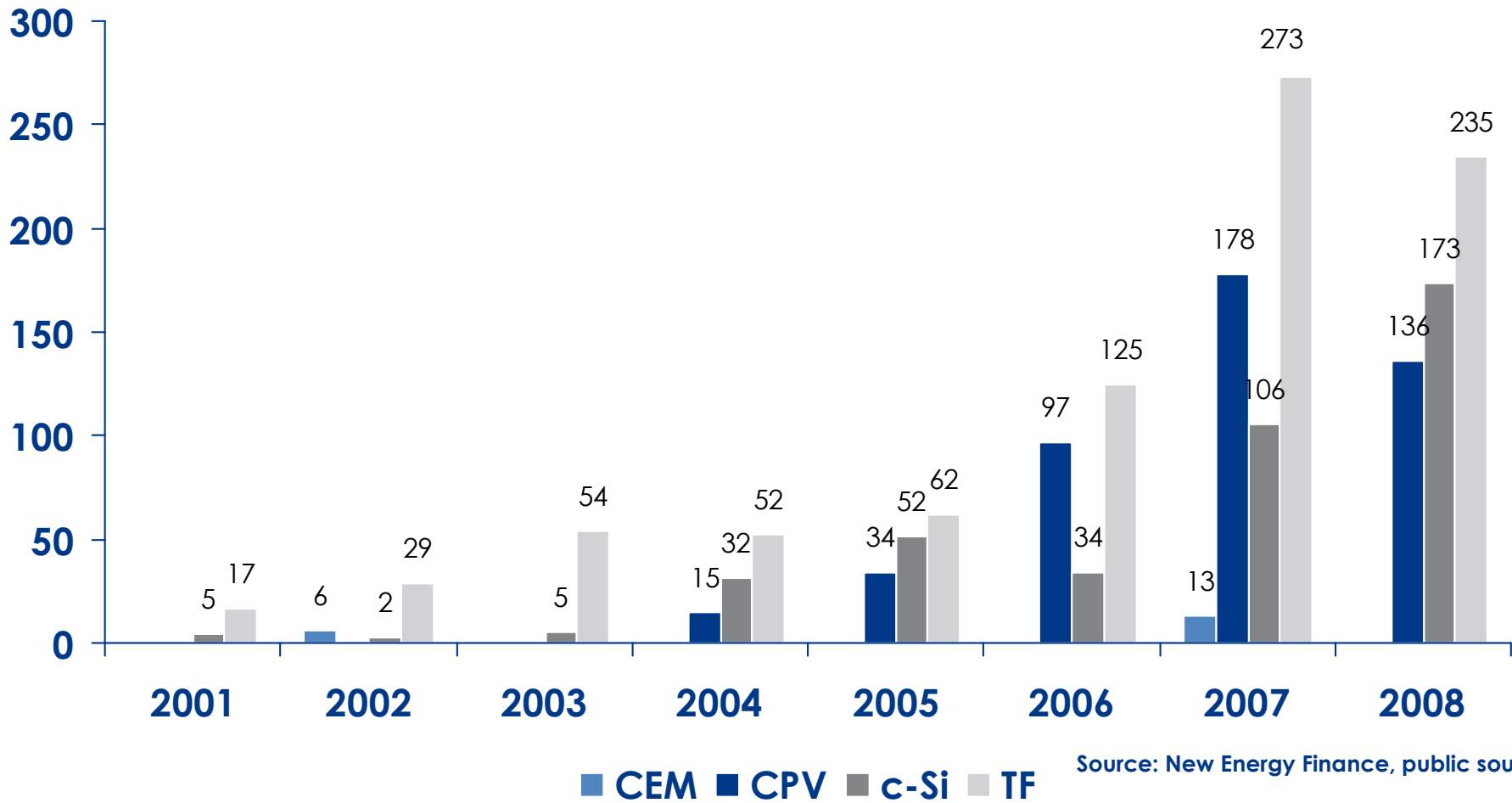
- **Incremental innovations have so far been the driver of growth for the PV sector**
 - Short term focus
 - Non disruptive
 - Rarely pick up on revolutionary innovations
- **Major role covered by consumable suppliers and equipment manufacturers**
- **Comment: well funded in growing markets**
 - Internal financing available
 - Implies that stimulating demand is an effective way to promote this type of innovation

Product Disruption

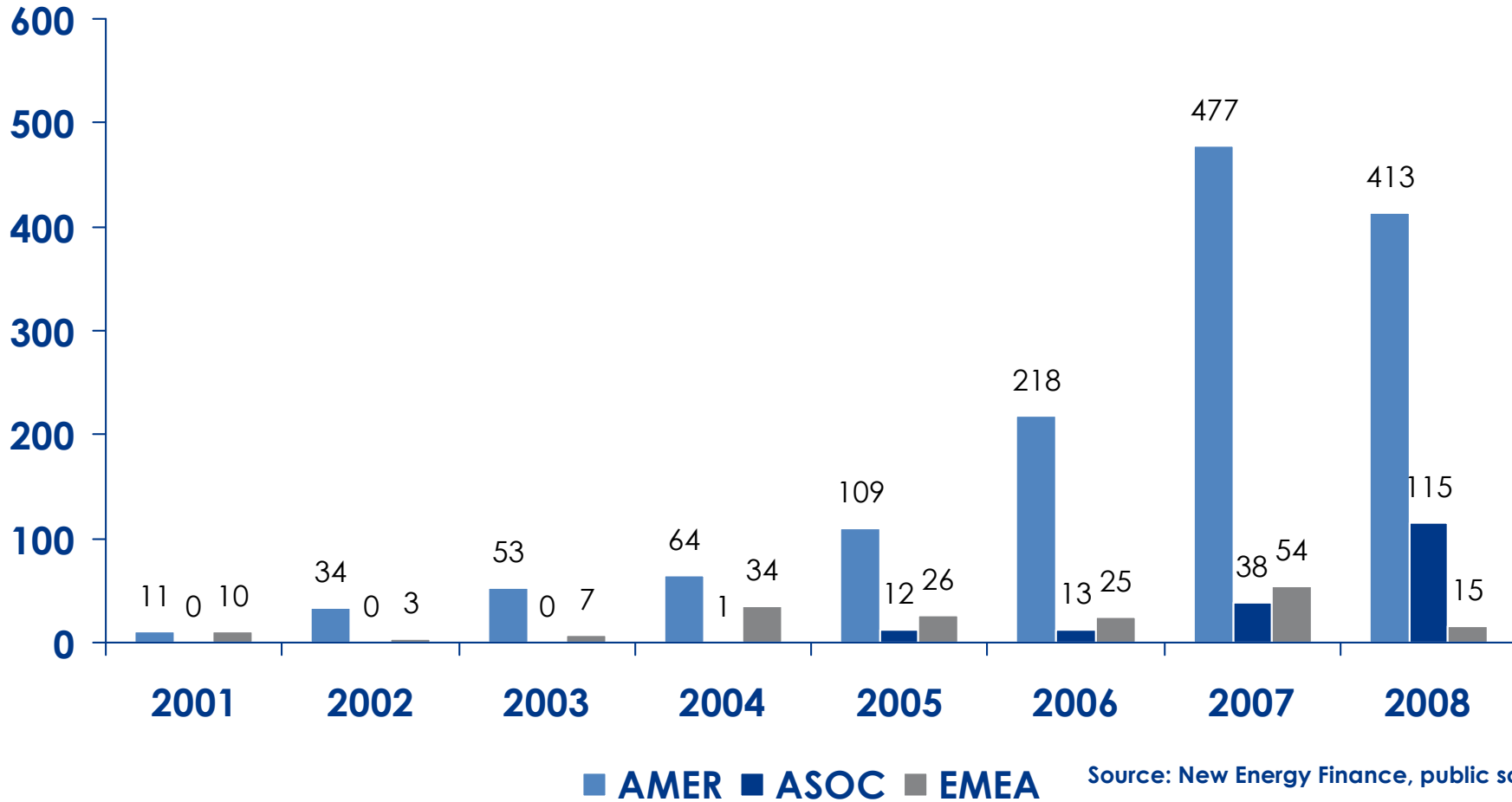


- **Disclosed early Seed/VC deal stats**
 - **Data log 2001-2008**
 - **Includes disclosed spin offs, angel, seeds, VC series A-B-C deals**
 - **Broken down in c-Si, CPV, Thin Films and equipment manufacturers (CEM)**
 - **Approximation by defect of investments from the private sector in early stage projects**

Early stage deals by Type (M\$)



Early stage deals by Region (M\$)



Seed/VC stats in PV: takeaways



- Key role in financing innovation (TF, CPV..)
- Lead to strong acceleration of technology life cycles
- Opportunistic rather than strategic:
 - Excellent instrument to promote new technologies
 - Weak in addressing strategic market needs (ECM)
 - Requires new ideas, does not create them
- Strong regional inhomogeneity
 - e.g. in 2007 US high-risk investments 10x EU
 - For comparison, EU PV market 10x US
- Comment: VC markets efficiency has negative correlation to sector growth rates

Incubation

- Sine qua non for development of new technologies
- Presents several challenges:
 - Resources intensive
 - Challenging to people
 - Requires ,last mile walk‘ for scientists
 - Applying economic thinking and boundaries to something which is still *research*
- Comment: Has weak correlation to growth, requires *direct support*

How to promote innovation

- **Investments in innovation would be encouraged by**
 - **Deeper/more efficient VC markets**
 - **Easier access to external finance**
 - **Public support to business innovation**
 - **Public-private partnerships for innovation**
- **The main driver for innovation, however, remains a good idea.**

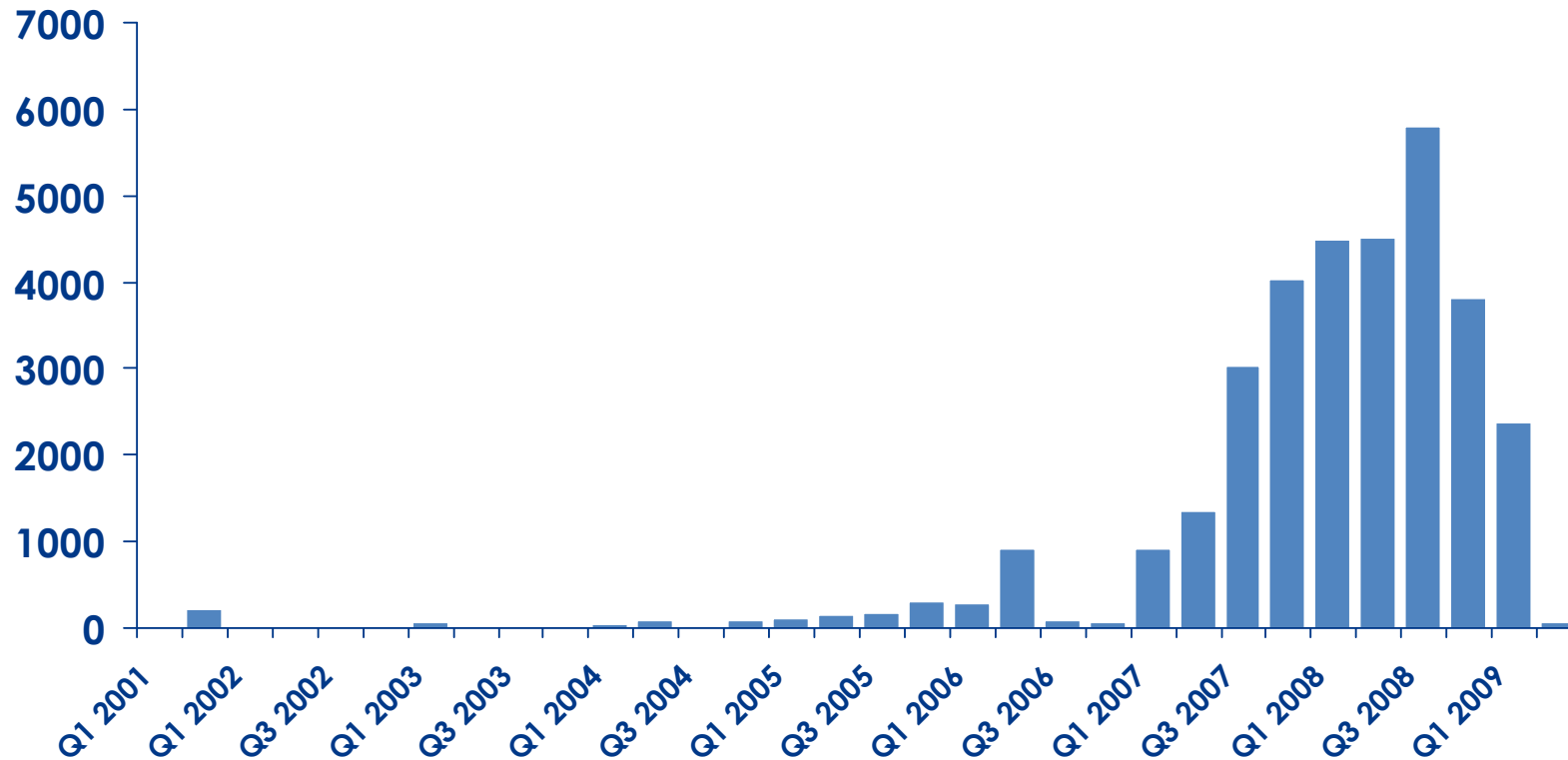
- **Factors that increase R&D intensity and innovation:**
 - **Competition**
 - **Stable macroeconomic conditions**
 - **Low real interest rates**
 - **Availability of internal and external finance**
 - **Expansion in public research**
 - **Openness to foreign R&D and cross-border knowledge transfer**

Going for Growth 2006; OECD 2006

What has changed with the crisis?



- Difficulties to access internal/external finance
 - Difficulties in financing expansions
 - Difficulties in financing assets (solar parks)



Source: New Energy Finance

■ Solar Projects

Looking through the crisis



- **From a strategic point of view, this is the moment to put the highest efforts in research and innovation**
 - increases competitiveness
 - stimulates sustainable growth
- **Public intervention is called upon to compensate for fluctuations of private sector investments in R&I**
 - Demand-side measures may have positive effects short term
 - Investments in R&I need to be sustained during a longer period of time to be effective

Public support to I&G

- **Public support to innovation and growth can be direct or indirect and namely through:**
 - **Funding and co-funding of public/private R&D projects and knowledge infrastructures**
 - **Product pushing mechanisms (e.g. grants, subsidised or guaranteed loans) that address specific strategic priorities**
 - **Demand pulling mechanisms (feed in tariffs, RPS, ITC..) that promote growth**
- **For these measures to be effective they shall pass through competitive and merit based selection**

Concluding remarks

- RES meet environmental and climate change targets, provide strategic and secure supply of energy**
- **For this reason they are coming high on the policy agenda and are part of stimulus packages**
- **PV Industry shall not loose focus**
 - **It all makes sense only if PV eventually reaches grid parity**
 - **It all makes sense only if the economical efforts required to meet this goal are sustainable (right price for the social, environmental and economical benefit)**
- **PV Industry shall keep on fostering its competitiveness**
- **Efficient innovation is the key to meet these targets**
- **Focus is required on market strategy and roadmap**



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