Industrial decarbonization risks and opportunities- a materials industry perspective

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Change is slow and capital intensive in Materials businesses

Degree of market familiarity ↓ / Degree of technology familiarity →	High	Low
Low	**Product-line extensions into new markets** ▪ Success rate 30-40% ▪ Time to commercialization 2-7 years (average 5) ▪ IRR 20-25%	**New product launches in new markets** ▪ Success rate 15-20% ▪ Time to commercialization 8-19 years (average 14) ▪ IRR 8-12%
High	**Incremental changes into existing markets** ▪ Success rate 40-50% ▪ Time to commercialization 2-5 years (average 4) ▪ IRR 18-23%	**New product launches in existing markets** ▪ Success rate 30-40% ▪ Time to commercialization 6-15 years (average 11) ▪ IRR 13-18%

Miremadl, Musso, & Oxgaard, *Chemical innovation: An investment for the ages (2013)*

- Technology change efforts have long times to market and low returns, with low NPV's and IRR's
- Businesses emphasize short-term deliverable with an incremental change mentality
- Rapid commoditization reinforces the short-term thinking
- Decarbonization forced through the same investment lens, which drives a focus on low-hanging fruit
  - Scope 1 as an incremental cost reduction and classifying portfolio as Scope 3

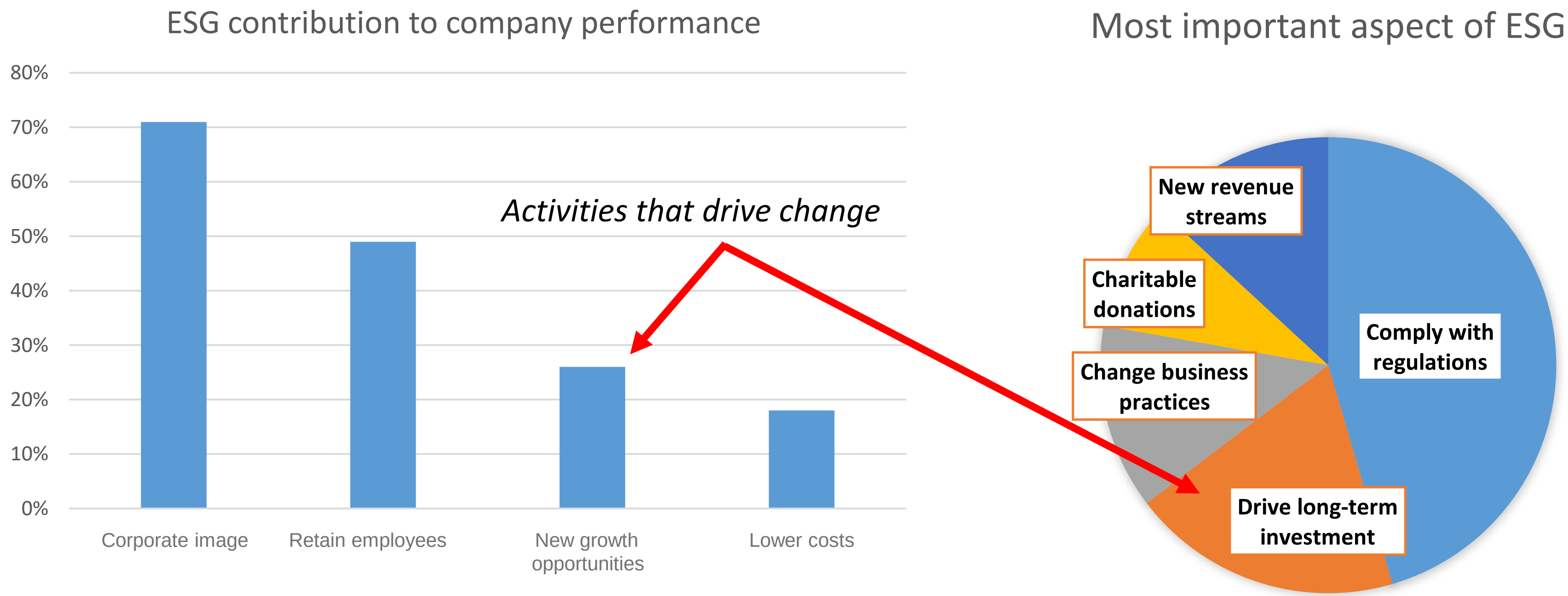
Environmental concerns cannot be ignored, so controlled action is taken

- Materials companies seek a balance between quarterly earnings and sustainability metrics
  - UN SDG, ESG investing, TCFD, SASB, and GRI
- Materials companies are in the wrong place in the value chain for unilateral action
  - Materials firms are generally B2B, upstream in the value chain
  - B2C companies control the market and determine pricing
- C-suite tenures are short- 6.5 yrs for CEO’s and 4 yrs for CMO’s in industrial sector*
  - Low incentives to take risk
  - Leaders incur the cost penalty but do not reap the benefits of long-term investments
- Focuses the company efforts on compliance as part of a short-term mentality
- Enables incremental positive adjustments in metrics in the face of a long-term challenge

* Korn Ferry analysis 1/2020

ESG activities reflect short-termism- Executive attitudes survey

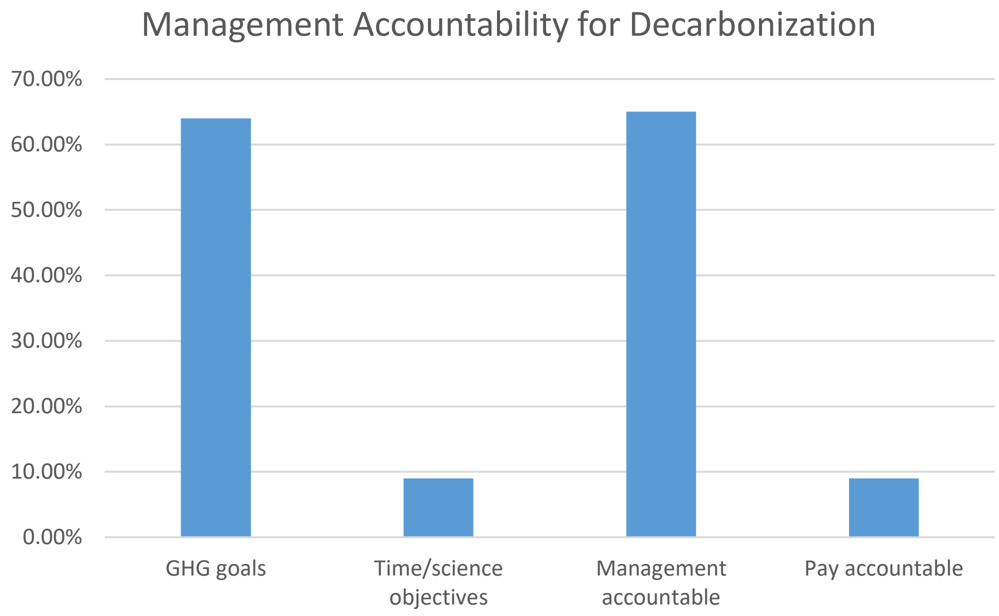
- ESG scores are increasing and high scores are shown to lead to higher shareholder value
- Pressure is applied by investors to continuously improve the environmental and financial performance of firms
- The balance allows “doing better, but not doing enough” behavior
- Impact on decarbonization is negligible
- Mismatch between climate needs and incentives to executives



McKinsey & Co. *The ESG premium: New perspectives on value and performance* (2020)

C-suite members lead based on their incentives

- Companies measure what they value and leaders act on what they can measure
- Incentives need to be designed to support the bold steps required for change
- Build strategy for decarbonization across multiple measurable activity horizons
  - Hold leaders *financially* accountable for their commitment to the investments
  - Provide detailed execution and investment roadmaps with measurable and timely objectives
  - Recognize that each horizon has its own execution risks and opportunities and they work together to achieve the end goal



Data from www.ceres.org/turningpoint

Change discussion from focus on costs to focus on opportunities

- There is profit to be made in activities across all 3 time horizons
  - Recognize that waste is waste and its elimination goes to the bottom line for the company and its value chain
  - Long-term stability and reputation of the company is enhanced by reaching the decarbonization goals
  - Influence in managing regulatory compliance can be increased
- Focusing on growth can gain investor and leader buy-in for an investment plan
  - Build and articulate a strong growth strategy based on a sustainable future, including bold steps and their future commercial value for the company
  - Advocate for and take advantage of incentives across all 3 horizons
    - Examples might include R&D tax credits targeted for decarbonization and carbon tax structure that drives investment
    - Provides investor support for a strategy of change and helps build patience
  - Leverage across the value chain and enable multi-company investment against common environmental goals
  - De-risk where required through public-private partnerships with early contributions from academia and national labs

Questions?