G. Albert Shoemaker Lecture

As part of the College of Earth and Mineral Sciences 125th Anniversary Celebration

April 9, 2021

Bill Cobb
Vice President, Chief Sustainability Officer
Escalating Stakeholder Expectations of the Mining Sector

- Inclusion and Diversity (workforce, leadership, Boards)
- Crisis Management and Pandemics

Base Metals
- Precious Metals
- Iron, Aluminum
- Rare Earths, Lithium
- Industrial Minerals & Aggregates
- Thermal Coal
- Metallurgical Coal

Cultural Heritage and Indigenous Peoples
- Tailings Management
- Climate, Carbon Footprint (scope 1, 2, 3)
- Water Supply and Stewardship
- Biodiversity Impacts
- Human Rights and UN Guiding Principles
- Social Performance
- Safety Performance
- Legacy Sites

Responsible Production and Supply Chains
- Disclosure Transparency

Shareholders
- Banks

NGOs
- Customers
- Consumers
- Suppliers

Crisis Management and Pandemics
- Climate, Carbon Footprint (scope 1, 2, 3)
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Digital Transformation and Skills for the Future
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Crisis Management and Pandemics

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Safety Performance
Stakeholders Want Responsible Production of Metals

Multiple Frameworks
- Commodities (such as Aluminum Stewardship Initiative, Copper Mark, Responsible Steel, Better Coal)
- Country Level (MAC’s Towards Sustainable Mining)
- Sectoral (such as ICMM’s Performance Expectations and/or Initiative for Responsible Mining Assurance [IRMA])
- Reporting (such as GRI, SASB, TCFD, IIRC)

Frameworks like ICMM, IRMA, and Copper Mark include the same types of requirements across environmental, social and governance (ESG) issues, are implemented at the site level and require a 3rd party to either audit or assure
- ICMM has 38 site-based requirements, Copper Mark has 32 and IRMA has 40; many of these requirements overlap and are linked
- ICMM’s Performance Expectations and Copper Mark are risk-based management system requirements and IRMA is prescriptive (e.g., specific regulations from all over the world for water quality, air, waste, noise, etc.)
- Disclosure approaches differ between frameworks

Reporting frameworks are shifting, with planned “collaboration” between GRI, SASB, TCFD, and IIRC to address the global need to focus on what information is important to various stakeholders
**Selected materials and applications**

1. Engine
   - Aluminium
   - Nickel (turbocargen)
   - Tungsten (cranks/port)
2. Microphone / Speaker
   - Rare earth elements
   - Nickel
   - Iron
   - Cobalt
3. LED Display
   - Rare earth elements
4. Windscreen / Windows
   - Glass
5. Interiors
   - Leather
   - Plastics
6. Catalytic converter
   - Palladium
   - Plastics
   - Rare earth elements
7. Paint / Pearlescent finish
   - Mica
   - Cobalt
8. Tyres
   - Rubber
   - Cobalt
9. Wheels
   - Graphite (bearings)
   - Steel / Iron
   - Tungsten (bearings, ball joints)
10. Suspension
    - Steel / Iron
11. Chassis
    - Aluminium
    - Steel / Iron
    - Tungsten
12. Body panels
    - Steel / Iron
13. Brakes
    - Graphite
    - Steel / Iron
    - Tungsten
14. Transmission
    - Nickel
    - Steel / Iron
15. Clutch
    - Graphite
16. Radiator
    - Copper

**Materials in applications found throughout a passenger vehicle**

- **Capacitors**
  - Found in systems for brake, power steering, transmission, electric motors etc.
  - Mica
  - Palladium
  - Tantalum
- **Electric motors**
  - Found in starter motor, alternator, windscreen wipers, air conditioning etc.
  - Graphite
  - Rare earth elements
- **Plating**
  - Found on engine parts, brake pads, chassis, trim, air conditioning etc.
  - Nickel
  - Zinc
- **Printed circuit boards**
  - Found in systems for braking, engine control, safety and security systems, GPS navigation and entertainment etc.
  - Aluminium
  - Copper
  - Gold
  - Nickel
  - Solder
  - Tin

**Applications found in electric/hybrid cars**

- Lithium-ion battery
  - Cobalt
  - Graphite
  - Lithium
  - Nickel
  - Rare earth elements
  - Zinc

Source: Drive Sustainability
Supply Chains Matter - Phones

Selected materials and applications

1. Casing
   - Aluminium

2. Printed circuit board
   - Aluminium
   - Copper
   - Gold
   - Nickel

3. Paint / Pearlescent finish
   - Mica

4. Circuitry
   - Copper
   - Gold
   - Palladium

5. Microphone / Speaker
   - Copper
   - Iron
   - Nickel
   - Rare earth elements

6. Capacitors
   - Palladium
   - Tantalum

7. Vibration unit
   - Rare earth elements
   - Tungsten

8. Battery
   - Cobalt
   - Graphite
   - Lithium
   - Nickel

9. Display screen
   - Glass
   - Rare earth elements
   - Tin

Materials in applications found throughout a smartphone

- Insulation
- Mica
- Solder
- Tin

Source: Drive Sustainability
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Water Supply and Stewardship

Biodiversity Impacts

Human Rights and UN Guiding Principles

Social Performance

Legacy Sites

Digital Transformation and Skills for the Future

Shareholders
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Digital Transformation and Skills for the Future
What is TCFD?

- TCFD = Task Force on Climate-related Financial Disclosures
- TCFD has emerged as the preferred disclosure framework for climate reporting driven by financial investors
- Disclosure framework recommends structure around four main pillars: Governance, Strategy, Risk Management, Metrics and Targets
- FCX supports TCFD and is committed to aligning future climate reporting with its recommendations

Source TCFD 2019
Pressure on Carbon Footprint from Automotive OEMs

Volvo Cars to radically reduce carbon emissions as part of new ambitious climate plan

Climate action: Bosch to be carbon neutral worldwide by 2020

VW presents ID.3 in full as “world first” carbon neutral electric car

Toyota Targets Zero Carbon Emissions from Vehicle Lifecycle, Plants by 2050

BMW, Mercedes, Audi, others race to make entire supply chain greener

OEMs will be putting pressure on the mining industry. For instance, automotive players are joining initiatives on responsible mining

<table>
<thead>
<tr>
<th>Time horizon to achieve target</th>
<th>Decarbonization target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute emissions</td>
<td>Emissions intensity</td>
</tr>
<tr>
<td>VOLVO</td>
<td>2025</td>
</tr>
<tr>
<td>MERCEDES BENZ</td>
<td>2039</td>
</tr>
<tr>
<td>NISSAN</td>
<td>2022</td>
</tr>
<tr>
<td>PSA GROUP</td>
<td>2034</td>
</tr>
<tr>
<td>RENAULT</td>
<td>2022</td>
</tr>
<tr>
<td>TOYOTA</td>
<td>2050</td>
</tr>
<tr>
<td>VOLKSWAGEN</td>
<td>2050 (^1)</td>
</tr>
<tr>
<td>GM</td>
<td>2030 (^1)</td>
</tr>
</tbody>
</table>

1. Does not include scope 3 emissions based on Science-based Targets (SBT)
2. 27/7/20 press release

Source: Company websites, company sustainability reports, Science Based Targets Initiative, Daimler sustainability report on scope 3
### Contribution: Scope 3 Emissions

<table>
<thead>
<tr>
<th>Upstream or downstream</th>
<th>Scope 3 category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upstream scope 3 emissions</strong></td>
<td>1. Purchased goods and services</td>
</tr>
<tr>
<td></td>
<td>2. Capital goods</td>
</tr>
<tr>
<td></td>
<td>3. Fuel- and energy-related activities (not included in scope 1 or scope 2)</td>
</tr>
<tr>
<td></td>
<td>4. Upstream transportation and distribution</td>
</tr>
<tr>
<td></td>
<td>5. Waste generated in operations</td>
</tr>
<tr>
<td></td>
<td>6. Business travel</td>
</tr>
<tr>
<td></td>
<td>7. Employee commuting</td>
</tr>
<tr>
<td></td>
<td>8. Upstream leased assets</td>
</tr>
</tbody>
</table>

| **Downstream scope 3 emissions** | 9. Downstream transportation and distribution |
|                                  | 10. Processing of sold products |
|                                  | 11. Use of sold products |
|                                  | 12. End-of-life treatment of sold products |
|                                  | 13. Downstream leased assets |
|                                  | 14. Franchises |
|                                  | 15. Investments |

- Defined by WRI/WBCSD Greenhouse Gas Protocol
Scope 3 Emissions Vary By Commodities and Business

Source: Transition Pathway Initiative
Our global GHG emissions have reduced 17% over the last 5 years.

GLOBAL GHG REDUCTION BY FIVE-YEAR TREND

- **2015**: 10,000 metric tons CO₂e (Thousands)
- **2016**: 8,000 metric tons CO₂e
- **2017**: 6,000 metric tons CO₂e
- **2018**: 4,000 metric tons CO₂e
- **2019**: 2,000 metric tons CO₂e

**2019 EMISSIONS (%)**
- **FMC Mining**: 62%
- **PT-FI**: 31%
- **FMC Processing**: 7%

Legend:
- FMC Mining Scope 1
- FMC Mining Scope 2
- FMC Processing Scope 1
- FMC Processing Scope 2
- PT-FI Scope 1
Americas Operations have made significant progress

- Copper production in the Americas (mine to cathode) represents 60% of global GHG emissions

- Mining and process innovations and grid decarbonization have decreased our GHG emissions per ton of copper cathode produced by 20% - almost 30% below a business-as-usual scenario - since 2012

- New Target Established - Reduce Americas Copper GHG emissions by 15% per ton of cathode by 2030, from 2018 levels
Peers

Not exhaustive

- Anglo American
- Teck
- Rio Tinto
- Vale
- Fortescue
- BHP

2019:
- Carbon Neutrality Scope 1&2 by 2040

Feb 2020:
- Carbon Neutrality Scope 1&2 by 2050
- Investment of US$1 B over next five years in technology for emissions reduction

May 2020:
- Carbon Neutrality Scope 1&2 by 2050 and 33% reduction by 2030

Jun 2020:
- Carbon Neutrality Scope 1 & 2 by 2040

Sep 2020 [updated from 2019]:
- Carbon Neutrality Scope 1&2 by 2050, with 30% reduction target between 2020-2030
- Link of executive remuneration to climate plan

1 February 2021: An inspirational commitment

De Beers
Carbon neutral commitment by 2030 through three pillars:

- Reduce
  - Reducing the energy intensity by 30% compared to 2016

- Replace
  - Replace fossil electricity with renewable energy and storage, and replacing fossil fuels with green fuels, such as green hydrogen and ammonia

- Recover
  - Implement carbon-neutrality solutions within its own operations and on the land that is within the scope of its control and that it supports rather than offset purchases.

Leading mining companies are taking action leading the technology readiness

- First all-electric mine (Borden, Canada)
- Hydrogen-powered haul truck development in partnership w/ ENGIE (South Africa)
- Boliden Haul-trucks trolley line pilot project (Aitik)
- 100% renewables energy by 2022 in Chile Operations

Source: Press search; Team analysis
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Post January 28, 2019 Brumadinho tailings failure and resulting 280 fatalities, an independent process to develop a global tailings standard was convened by the ICMM, Principles for Responsible Investing, and UN Environmental Programme (see globaltaillingsreview.org)

The Global Industry Standard for Tailings Management was launched August 5, 2020 with 77 auditable requirements; ICMM members committed to implement for all “extreme or very high consequence” facilities within 3 years and all others within 5 years

Six core topics
- Focus on project-affected peoples
- Development of environmental/social knowledge base for facilities
- Lift the life-cycle performance of facilities
- Management and governance of facilities
- Emergency preparedness and response
- Disclosures for public accountability
Example Requirements

- **Requirement 1.3:** Demonstrate that project-affected people are meaningfully engaged throughout the tailings facility lifecycle in building the knowledge base and in decisions that may have a bearing on public safety and the integrity of the tailings facility. The Operator shall share information to support this process.

- **Requirement 4.3:** The Accountable Executive shall take the decision to adopt a design for the current Consequence Classification criteria and to maintain flexibility to upgrade the design for the highest classification criteria later in the tailings facility lifecycle. This decision shall be documented.

- **Requirement 8.5:** Appoint a site-specific Responsible Tailings Facility Engineer (RTFE) who is accountable for the integrity of the tailings facility, who liaises with the EOR and internal teams such as operations, planning, regulatory affairs, social performance and environment, and who has regular two-way communication with the Accountable Executive. The RTFE must be familiar with the Design Basis Report, the design report and the construction and performance of the tailings facility.
Example Requirements

- Requirement 15.1: Publish and regularly update information on the Operator’s commitment to safe tailings facility management, implementation of its tailings governance framework, its organization-wide policies, standards or approaches to the design, construction, monitoring and closure of tailings facilities
  - A description of the tailings facility and its Consequence Classification
  - A summary of risk assessment findings relevant to the tailings facility
  - A summary of impact assessments and of human exposure and vulnerability to tailings facility credible flow failure scenarios
  - A summary of material findings of annual performance reviews and DSR, including implementation of mitigation measures to reduce risk to ALARP
  - A summary of material findings of the environmental and social monitoring programme including implementation of mitigation measures
  - A summary version of the tailings facility EPRP for facilities that have a credible failure mode(s) that could lead to a flow failure event and includes emergency response measures that apply climate change
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March 10, EU Parliament voted for a proposal that calls on the Commission to urgently pass a law that requires companies to comply with human rights and environmental standards within their value chain.

Due diligence requires companies to identify, address and remedy their impact on human rights and the environment throughout their value chain.

Rules should apply to all companies operating in EU internal market, including those from outside the EU.

Sanctions for non-compliance and legal support for victims of corporations in third world countries.

Ban on import of products linked to severe human rights violations such as forced or child labour.
### Human Rights Are Broad

#### Human Rights Dashboard

Topics reflected in the dashboard are mapped against recognized international human rights.

<table>
<thead>
<tr>
<th>Employees</th>
<th>Value Chain</th>
<th>Community</th>
<th>Environment</th>
<th>Third Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working conditions</td>
<td>Working conditions</td>
<td>Standards of living / quality of life</td>
<td>Pollution</td>
<td>Conduct of private security forces</td>
</tr>
<tr>
<td>Safe and healthy working conditions</td>
<td>Safe and healthy working conditions</td>
<td>Community health and safety</td>
<td>Water security</td>
<td>Conduct of government security forces</td>
</tr>
<tr>
<td>Discrimination</td>
<td>Discrimination</td>
<td>Economic activity / livelihoods</td>
<td>Waste and hazardous materials management</td>
<td>Contribution to conflict</td>
</tr>
<tr>
<td>Freedom of association and collective bargaining</td>
<td>Freedom of association and collective bargaining</td>
<td>Minorities and indigenous peoples</td>
<td>Increased exposure to natural hazards</td>
<td>Presence of artisanal / small-scale miners</td>
</tr>
<tr>
<td>Child labor</td>
<td>Child labor</td>
<td>Displacement / resettlement</td>
<td></td>
<td>Corruption</td>
</tr>
<tr>
<td>Privacy</td>
<td>Privacy</td>
<td>Cultural heritage</td>
<td></td>
<td>NGOs and civil society groups</td>
</tr>
<tr>
<td>Forced and compulsory labor</td>
<td>Forced and compulsory labor</td>
<td>Children's rights, including access to education</td>
<td></td>
<td>Judicial system (access to remedy)</td>
</tr>
</tbody>
</table>
### 2020 Corporate Human Rights Benchmark Results

<table>
<thead>
<tr>
<th>Score out of 26</th>
<th>Company</th>
<th>Score change from 2019 on the CHRB Core UNGP indicators</th>
<th>Key information</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Eni</td>
<td>+6</td>
<td>Tied for 5th among 57 extractives</td>
</tr>
<tr>
<td>23.5</td>
<td>Rio Tinto*</td>
<td>0</td>
<td>7th out of 199 firms from extractives, agriculture, apparel and ICT sectors</td>
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<tr>
<td>21.5</td>
<td>BP</td>
<td>+4.5</td>
<td></td>
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<tr>
<td>20.5</td>
<td>Repsol</td>
<td>-0.5</td>
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<td>20.5</td>
<td>Royal Dutch Shell</td>
<td>+2</td>
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<td>20.5</td>
<td>Total</td>
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<td>Anglo American</td>
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<td>Teck Resources</td>
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<td>Barrick Gold Corporation</td>
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<td>Grupo Mexico</td>
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<td>9.5</td>
<td>Occidental Petroleum</td>
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<td>9.5</td>
<td>Siam Cement (SCG)</td>
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<td>ArcelorMittal</td>
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<td>Canadian Natural Resources</td>
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<td>8</td>
<td>Novolipetsk Steel</td>
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<td>6</td>
<td>Coal India</td>
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<td>Suncor Energy</td>
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<td>Inpex</td>
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<td>4.5</td>
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<td>4.5</td>
<td>Oil and Natural Gas</td>
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<td>Marathon Oil</td>
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<td>3.5</td>
<td>Vulcan Materials Company</td>
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<td>3</td>
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<td>3</td>
<td>Tatneft</td>
<td>0</td>
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</tr>
<tr>
<td>2.5</td>
<td>China Petroleum and Chemical Corporation Limited (Sinopec)</td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>EOG Resources</td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Nippon Steel Corporation</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Devon Energy Corp</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Anhui Conch Cement</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>China National Offshore Oil Corporation (CNOOC Group)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>China Shenhua Energy</td>
<td>+1.5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Saudi Aramco</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Surgutneftegaz</td>
<td>+1</td>
<td></td>
</tr>
</tbody>
</table>

The newly benchmarked **automotive sector** (separate evaluation) is the **worst performing ever** in the CHRB; supply chain management is a major area of weakness – hence related requests from Daimler, Ford, cable makers, etc.
Escalating Stakeholder Expectations of the Mining Sector

Base Metals
Precious Metals
Iron, Aluminum
Rare Earths, Lithium
Industrial Minerals & Aggregates
Thermal Coal
Metallurgical Coal

Inclusion and Diversity (workforce, leadership, Boards)

Cultural Heritage and Indigenous Peoples

Tailings Management

Climate, Carbon Footprint (scope 1, 2, 3)

Water Supply and Stewardship

Biodiversity Impacts

Human Rights and UN Guiding Principles

Social Performance

Legacy Sites

Responsible Production and Supply Chains

Disclosure Transparency

Digital Transformation and Skills for the Future
<table>
<thead>
<tr>
<th>Total AUM</th>
<th>BlackRock</th>
<th>Vanguard</th>
<th>State Street</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US$8.7 trillion</td>
<td>US$6.2 trillion</td>
<td>US$3.2 trillion</td>
</tr>
<tr>
<td>Climate</td>
<td>Disclose plan for how the company’s business</td>
<td>Expects a “climate competent board” that is</td>
<td>In 2021, will focus on specific companies</td>
</tr>
<tr>
<td></td>
<td>model will be compatible with a net zero GHG</td>
<td>highly engaged and will ensure that climate-</td>
<td>especially vulnerable to the transition</td>
</tr>
<tr>
<td></td>
<td>emissions economy (i.e. alignment with Paris</td>
<td>related risks and opportunities influence</td>
<td>risks of climate change</td>
</tr>
<tr>
<td></td>
<td>Agreement where global warming is limited to</td>
<td>short- and long-term planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>well below 2ºC)</td>
<td>In addition to TCFD-aligned climate disclosure,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disclosure should be TCFD-aligned and</td>
<td>expects companies to disclose how their board</td>
<td>Expects TCFD-aligned climate disclosure</td>
</tr>
<tr>
<td></td>
<td>include details on how the 2050 net zero plan</td>
<td>oversees climate-related strategy and risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>is incorporated into long-term strategy of the</td>
<td>management – focused on governance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>company and reviewed by the board of directors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversity and</td>
<td>Encourages disclosure of demographics related</td>
<td>In 2021, their funds may vote against directors</td>
<td>In 2021, will vote against the Chair of</td>
</tr>
<tr>
<td>Inclusion</td>
<td>to board diversity, including gender,</td>
<td>(nominating committee chair or other relevant</td>
<td>the Nominating &amp; Governance Committee at</td>
</tr>
<tr>
<td>(Board and</td>
<td>ethnicity, race, and geographic location, as</td>
<td>directors) at companies where progress on</td>
<td>companies that do not disclose the racial</td>
</tr>
<tr>
<td>Workforce)</td>
<td>well as milestones to achieve “multi-</td>
<td>board diversity falls behind “market norms</td>
<td>and ethnic composition of their boards</td>
</tr>
<tr>
<td></td>
<td>faceted racial, ethnic, and gender</td>
<td>and expectations” (i.e., 0% gender diversity</td>
<td>In 2022, will vote against the Chair of</td>
</tr>
<tr>
<td></td>
<td>representation.”</td>
<td>and racial or ethnic diversity and a lack of</td>
<td>the Compensation Committee at companies</td>
</tr>
<tr>
<td></td>
<td>Expects disclosure of workforce demographics,</td>
<td>board diversity disclosure and policy</td>
<td>that do not:</td>
</tr>
<tr>
<td></td>
<td>such as gender, race and ethnicity in line</td>
<td>Expects disclosures of workforce diversity</td>
<td>(1) disclose their EEO-1 Survey</td>
</tr>
<tr>
<td></td>
<td>with the EEO-1 Survey, along with steps</td>
<td>measures (gender, race and ethnicity) at the</td>
<td>responses (workforce data); and</td>
</tr>
<tr>
<td></td>
<td>being taken to advance diversity, equity and</td>
<td>executive, nonexecutive, and overall workforce</td>
<td>(2) have at least 1 director from an</td>
</tr>
<tr>
<td></td>
<td>inclusion</td>
<td>levels. EEO-1 data in US is required for most</td>
<td>underrepresented community on their</td>
</tr>
<tr>
<td></td>
<td>Talent strategy disclosure should fully reflect</td>
<td>Vanguard funds.</td>
<td>boards.</td>
</tr>
<tr>
<td></td>
<td>the company’s long-term plans to improve</td>
<td>Expects Boards to ensure management has</td>
<td></td>
</tr>
<tr>
<td></td>
<td>diversity, equity and inclusion, as</td>
<td>long-term strategies in place for workforce</td>
<td></td>
</tr>
<tr>
<td></td>
<td>appropriate by region</td>
<td>diversity/development</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Frameworks: Seeking SASB- and TCFD-aligned</td>
<td>Frameworks: Supports SASB &amp; TCFD frameworks</td>
<td>Frameworks: SASB is viewed as a minimum</td>
</tr>
<tr>
<td></td>
<td>ESG disclosures from investment companies by</td>
<td>Focused on four key governance areas:</td>
<td>ESG disclosure standard</td>
</tr>
<tr>
<td></td>
<td>year-end 2020 (prior to 2021 proxy vote)</td>
<td>(1) board composition, (2) oversight of</td>
<td>ESG Scores: Will take voting action</td>
</tr>
<tr>
<td></td>
<td>Board tenure: Considers average board</td>
<td>strategy and risk, (3) executive</td>
<td>against board members at companies that</td>
</tr>
<tr>
<td></td>
<td>tenure when evaluating board refreshment</td>
<td>compensation, (4) governance structures</td>
<td>are bottom 10% of proprietary R-Factor</td>
</tr>
<tr>
<td></td>
<td>processes and may now oppose boards that</td>
<td></td>
<td>scores</td>
</tr>
</tbody>
</table>
Questions