

SUSTAINABLE MINING AND GEOINFORMATION

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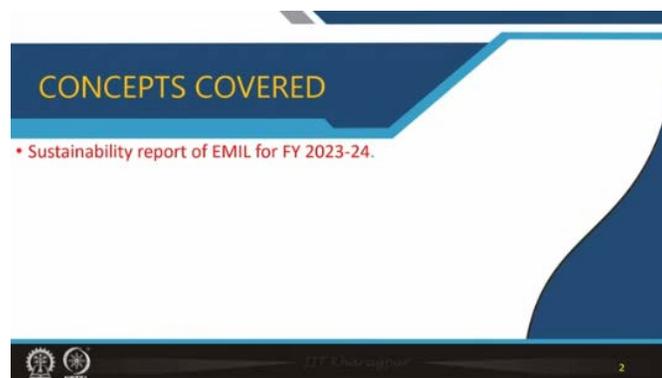
Indian Institute of Technology Kharagpur

Week – 12

Lecture 60: Sustainable Development in Mining Industry

A Case Study

Welcome, student, to the last lecture of our NPTEL course on "Sustainable Mining and Geo-information". Today is lecture number 60, and in today's lecture, we shall discuss sustainable development in the mining industry. We shall discuss a case study. We will take an example mining industry and we will discuss the sustainable reporting. What are the different efforts and measures they have taken so that the mining industry proceeds in the direction of sustainable development? So, we are particularly talking about one industry that operates in the mining sector. So, ESSEL Mining and Industries Limited, EMIL, is a part of the global conglomerate Aditya Birla Group. You know about the Aditya Birla Group, they have business in diverse sectors. EMIL is operating in the mining sector, both in the coal mining as well as in the iron ore mining, beneficiation, and pelletization. They are also operating in the ferro alloys sectors and also they are operating in the renewable energy sector. So, you can see coal, non-coal, iron ore, ferro alloy, and renewable energy. So, this is a complete umbrella of mining and allied industries that they are operating.



Essel Mining & Industries Limited

- EMIL, part of Aditya Birla Group, is a diversified natural resource company operating within the sectors of coal mining, Iron Ore Beneficiation & Pelletization, Noble Ferro Alloys (NFA), and renewable energy sectors.
- **Vision: Enriching Lives Through Responsible Mining**
- Sustainability report of EMIL summarizes efforts towards Environment (E), Social (S) and Governance (G) parameters across value chain.
- EMIL's sustainability report adheres to international Standards and Frameworks, material approach, and Assurance.
- **Standards and Frameworks:** *Global Reporting Initiative (GRI), United Nations Sustainable Development Goals (UNSDG)*
- **Assurance:** Followed ISAE 3000 assurance standard.

Dr. Shashank

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If you look at the EMIL, their vision is enriching lives through responsible mining, which is their tagline or vision, and as I have discussed in the previous class, every company, including the mining industry, has to submit an annual report. It is mandatory that they have to submit an annual report stating their financial performance, as well as they have to also discuss their CSR activities. Now they have to also discuss their ESG environment, social, and governance. So, we call it the sustainability report, whether it is the ESG, whether it is the CSR reporting, and also, we have previously talked about the BRSR report. As per the Companies Act, all companies have to submit the BRSR report. So, all together we can call it a sustainability report. So, in a sustainability report, sometimes we also talk about an ESG report, and we talk about the CSR report. So, together we can call it a sustainability report where the CSR, the ESG, and the BRSR are all part of the sustainability report. Now, every company has to submit a sustainability report. EMIL has submitted in their annual report for the financial year 2023-24, a sustainability report. We have collected the information from that report just to discuss how a company is producing the sustainability report.

How is it reporting the report to their stakeholders, to their shareholders, so that they communicate about their sustainability program, sustainability performance to different stakeholders, including shareholders, the regulator, the community, and also to other stakeholders. So, EMIL's sustainability report summarizes its efforts towards ESG across the value chain, and they are also following the international standard of reporting, i.e., the GRI report, the Global Reporting Initiative. Also, they are mentioning what their contribution is towards the United Nations Sustainable Development Goals, the UNSDGs.

What are they doing to fulfill the different UN SDGs? You remember there are 17 Sustainable Development Goals. So, what actions are they taking? And lastly, whatever report they are submitting, it has to comply with some assurance standard also. Internationally, they want to know, what is the reliability of your report? You are providing so much data in the annual report for the shareholders, for all the stakeholders, but what is the reliability? How reliable is your report? So, particularly for your environmental report, how reliable is your safety report? There is also a standard, called the assurance standard, and we have the ISAE 3000 assurance standard. The EMIL sustainable report is also complying with the ISAE 3000 assurance standard.

So, to introduce you to this mining company, particularly EMIL, they have four business areas, especially commercial coal mining. They have a coal mine, the Bandha coal mining project, and they also provide mining services. Nowadays, if you look, there are many mining operators that are giving the mining operation entirely to a third party, which is called a mining service provider. So, this Birla Group of companies, EMIL, also provides mining services. They own the equipment, they do the extraction, everything—they produce the coal, and they get paid based on how much coal they have produced and how much overburden they have removed. So, that is called mining services. EMIL provides mining services to four coal mines: Bhubaneswari Coal Mining in Odisha, Rajamahal Coal Mining Limited, Amelia Coal Mining Limited in Madhya Pradesh, and Subhadra Coal Mining Limited in Odisha. They are involved in the manufacturing of iron ore pelletization, and they also have an industry of noble ferro-alloys. In the renewable sector, they are producing solar and wind power. So, this is the total spectrum of the industries—mining and allied industries—in which they operate, and we will discuss their sustainability performance for the year 2023. Particularly, here in this class, we are using the terms sustainability and ESG almost synonymously. Sometimes, I will talk about sustainability, sometimes I will use the word ESG. I am using these interchangeably, and actually, there are many commonalities.

Business areas of EMIL

Four business areas of EMIL:

Commercial Coal Mining: Bandha Coal Mining Project

Mining Services:

- Bhubaneshwari Coal Mining Limited (BCML)
- Rajmahal Coal Mining Limited (RCML)
- Amelia Coal Mining Limited (AMCL)
- Subhadra Coal Mining Limited (SCML)

Manufacturing:

- Iron ore Beneficiation and Palletization
- Noble Ferro Alloys

Renewables:

- Solar Power, Wind power





Sustainability Performance FY 2023-24

- Sustainability Report covers the financial year 2023- 2024
- Sustainability and ESG used synonymously.
- EMIL Supported **five focus areas** like:
 - Health,
 - Education,
 - Infrastructure,
 - Disaster relief and
 - Social Development





So, for all practical purposes, whether it is ESG or sustainability, they are very similar, although there are slight differences. But we can consider them synonymous. Now, for sustainability, EMIL focuses on five prime areas, five focus areas of sustainability. These are health, education, infrastructure, disaster relief, and social development. If you remember, we have also discussed the CSR policy of Tata Steel. Their focus areas are similar—they also work in health, education, infrastructure development (rural and urban), disaster relief, and socio-cultural ethnicity. Because, as you know, the company has to engage in CSR activities as per CSR rules. Most of the areas listed in Schedule 7 of the Companies Act must be followed, so you will see most focus areas are similar, whether it is Tata Steel, EMIL, or the Birla Group. They overlap, actually. So, environmental sustainability—EMIL’s ESG vision? EMIL understands the critical role of responsible mining and is committed to advancing a sustainable future across three dimensions: people, planet, and prosperity. You remember, when I talked about the BRSR report as advised by the Bombay Stock Exchange, the National Stock Exchange, and SEBI, they have also

adopted the principle of 'People, Planet, and Prosperity.' Because these are big companies—whether Tata Steel or EMIL—they must provide disclosures at various forums: CSR, SEBI, stock exchanges, and other regulators.

Environmental Sustainability

EMIL's ESG Vision:
EMIL understands critical role of Responsible Mining, and its commitment to advancing a sustainable future across 3 dimensions: *People, Planet, and Prosperity*.

GHG Emission Reduction:

- GHG emission reported separately.

Energy Management

- Generated 155 MW of solar and wind power.
- Expanding renewable energy capacity across operations.
- Future Goals: Aims to achieve net-zero emissions.
- Reduced energy intensity through state-of-the-art machinery and renewable energy integration.

Dr. [Name]

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Much of the information in these reports—whether sustainability or ESG—has a lot of overlap. Regarding environmental sustainability, we will discuss different environmental parameters and what efforts or activities EMIL has undertaken. The first parameter is GHG emission reduction. GHG emission reduction is reported separately. We will discuss this after a few slides—GHG emissions are part of climate change and air pollution. They are doing a lot for GHG reduction, which I will discuss later. Energy management is another parameter. EMIL generated 155 MW of solar and wind power, renewable energy. They are trying to shift from fossil fuel-based energy to renewable energy. They are expanding their renewable energy capacity—both solar and wind power—across operations, and their future goal is to achieve net-zero emissions. What is a net-zero emission? We have already discussed what net-zero emissions are. They are trying to achieve net-zero carbon dioxide emissions. They have reduced energy intensity through state-of-the-art machinery and renewable energy integration. They are improving machinery, making it more energy-efficient, and innovating to reduce energy intensity. Renewable energy will be used more and more, so greenhouse gas emissions will decrease. In the future, they aim to achieve net-zero emissions. Now, in biodiversity, land reclamation, and land rehabilitation, reclaiming mined-out areas is a requirement. As per the mine closure plan we discussed, you must reclaim the land.

So, whether it is EMIL or any other mining company, it is a statutory requirement, and all mining companies have to do it. Conduct ecosystem restoration by planting indigenous flora in the mined-out area. Again, that also any mining company has to do the progressive mine closure, then the final mine closure, where land reclamation, afforestation is a very, very important requirement. So they have adopted the Miyawaki technique to create a dense forest quickly. Miyawaki technique of afforestation is actually a Japanese technique where, in a limited small area, you use some of the species so that they grow very quickly, and your carbon intensity and vegetation intensity are higher. Implemented biodiversity assessment to ensure no net loss of biodiversity. These are the measures they have taken for biodiversity and land reclamation. In the case of water management, water is a main pollutant in the mining industry, and the impact on the water environment is very significant in the case of mining. So water is also a main parameter in sustainability. So, zero discharge operation at all facilities. So that is a very, very important measure that they have taken. Harvested over 500 million liters of rainwater for use. Now, rainwater harvesting in the mining area is very, very important because in the mining area, there is a depletion of the groundwater table. In the summer season, in the dry season, there is also a scarcity of water. So, rainwater harvesting is very, very important for water management, and they have been doing it. Integrated water audit to optimize water usage and minimize waste; Mining industry and beneficiation plants are using a lot of water and contaminating the environment. So, water audit is a must, how much water you are using, how much you are wasting, and how you can reduce your water consumption through water conservation measures. So, they are also doing a water audit. At ACML, RCML, and BCML, these are the different coal mines where they are providing the services. Water collected within the mines is stored and repurposed for domestic usage and dust control activities.

Environmental Sustainability

Biodiversity and Land Rehabilitation:

- Reclaiming mined-out areas
- Conducted ecosystem restoration by planting indigenous flora in mined-out areas.
- Adopted the Miyawaki technique to create dense forests quickly.
- Implemented biodiversity assessments to ensure "No Net Loss."

Water Management:

- Zero discharge operations at all facilities.
- Harvested over 500 million liters of rainwater for reuse.
- Integrated water audits to optimize water usage and minimize waste.
- At ACML, RCML, and BCML: water collected within mines is stored and repurposed for domestic usage and dust control activities.

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So, you know in the open pit mines you have a pit where water can be stored and that stored water can be collected, treated, so that it can be used for different uses, industrial uses, domestic uses: non-drinking, non-cooking, other uses can be done. The stored water can be used for various mining uses: a lot of water is used for dust control, for irrigating the plantation area, etc. So they are also doing that. Now, social sustainability, or ESG, is about what they are doing for society. A community engagement project is being done for socio-economic development. The company has spent more than Rupees 25 crore on a CSR program in the healthcare, education, skill development, and infrastructure sectors. These programs, cumulatively, have benefited 11,000 villagers and covered 11 million lives since their inception. This figure is not an annual figure, but a cumulative figure. In healthcare, they are providing mobile healthcare units, the Lifeline Express train, which provides healthcare in remote areas. They are also providing training on how to make vermicompost for the social agricultural program. They are also giving training for micro enterprises on how the village people, community people can open small businesses. So, vermicompost training and micro enterprise initiatives to support agriculture in those mining areas with diversity and inclusion, particularly in the working space, for the workers or employees.

Social Sustainability

Community Engagement:

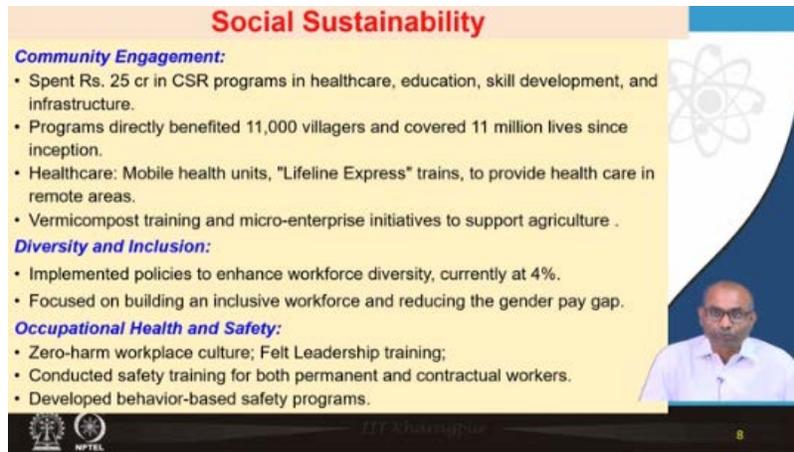
- Spent Rs. 25 cr in CSR programs in healthcare, education, skill development, and infrastructure.
- Programs directly benefited 11,000 villagers and covered 11 million lives since inception.
- Healthcare: Mobile health units, "Lifeline Express" trains, to provide health care in remote areas.
- Vermicompost training and micro-enterprise initiatives to support agriculture .

Diversity and Inclusion:

- Implemented policies to enhance workforce diversity, currently at 4%.
- Focused on building an inclusive workforce and reducing the gender pay gap.

Occupational Health and Safety:

- Zero-harm workplace culture; Felt Leadership training;
- Conducted safety training for both permanent and contractual workers.
- Developed behavior-based safety programs.



They are implementing policies to enhance workforce diversity. This is a requirement of the Sustainable Development Goal that the gender ratio, that is, how many males are there and how many females are there, is also a requirement. If you remember the BRSR format, there is also the Gender Inclusivity is one parameter. They are taking policies to improve female participation in the workforce, now focused on building an inclusive workforce and reducing the gender pay gap. Now, there is talk about the gap between the payment for the male worker and the female worker; there should be a reduced gap. Ideally, there should not be a gap in payment between the two genders. Now, gradually, it is happening. So, they are trying to reduce the gender pay gap. In the occupational health and safety domain for the workforce that is working in the mines and the plant. Occupational health and Safety: They have adopted a zero-harm workplace culture, and for that, they have provided and are providing "Felt leadership training" to their officers, to their executives, to the workers. "Felt leadership training" is a training program given to the industry leaders so that they can take, implement an occupational health and safety program to reduce the hazards. The "Felt leadership training program is an international program that conducts safety training for both permanent and contractual workers and develops behavior-based safety programs. These are for occupational health and safety in the governance and compliance domain. Risk management: It particularly incorporates climate risk into the enterprise risk framework, in the mining industry, opencast or underground.

Particularly, in the open-cast mines, the mining operations are influenced by weather and climate events, particularly if there is large or intense rainfall, then mining operations cannot go on for some time. If it is a very extreme summer, then also mining working hours

are reduced. If it is extremely cold, working hours are reduced. So now with climate change, these extreme events are becoming more frequent, such as flooding and hot temperatures, so the mining industry is influenced by this climate change. So, how to incorporate these climate risks into the performance, financial performance, as well as the safety performance. With climate risk, the safety of the workers is also involved. So, conduct a site-specific inspection to assess the climate change risk and adapt to climate change to develop a program and safety programs for the workers, so that they can adapt to the climate change risk. Transparency and reporting, sustainability reporting, ESG reporting: Transparency reporting is very important. We have to follow different accepted standards. This company is following the Global Reporting Initiative (GRI) standard. We have already discussed GRI, which is about the sustainability disclosure. There is another standard that is followed. It is called the Carbon Disclosure Project (CDP) with respect to carbon and greenhouse gas emissions. There are some standard reporting formats, so they are also following this CDP standard, and of course, their disclosure also correlates to the UNSDG, United Nations Sustainable Development Goals. There are 17 goals.

Governance and Compliance

Risk Management:

- Incorporated climate-related risks into enterprise risk frameworks.
- Conducted site-specific inspections to assess and adapt to climate change risks.

Transparency and Reporting:

- Follows international reporting standards, e.g. GRI and Carbon Disclosure Project (CDP) and UNSDG.
- Regular stakeholder engagement to address concerns and grievances.
- Strengthening partnerships with all stakeholders to magnify operational impact.

Governance & Accountability:

- A Foundation for Trust and Integrity
- Robust governance mechanisms

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So, what actions are they taking to contribute to the 17 different goals? There are many goals that are relevant to mining, and their actions and measures are contributing to the UN Sustainable Development Goals, which are also reported. A regular stakeholder engagement to address their concern and to address their grievances. Strengthening partnership with all stakeholders to magnify operational impact, governance, and accountability, a foundation for trust and integrity. They have a foundation and a robust governance mechanism that they are following now. This is an important item in the report

on sustainability, use of technology towards sustainability, particularly the digital technology advancement. Now, they are following a pilot video analytics initiative for generating alerts when someone enters the plant without a helmet. A camera video will be used for data analysis, and then it will give an alarm so that the people will be alerted. If somebody is coming without a helmet, it can be detected, and they can be asked to come with a helmet. So, this will enhance the safety of the employee who, by mistake or forgetfulness they comes without the helmet and may meet with a hazard. So, that's how this digital advancement technique, an AI-based technique, is useful. Aditya Birla Science and Technology Center is collaborating with EMIL to research new technology, new initiatives, and innovations that can help reduce and reuse waste. We know in the mining industry, waste is a big problem. So, how can we reduce waste generation, how can we recycle, how can we reuse waste, and produce useful products from waste material? We have discussed that a lot of research and development is required to develop technology so that the waste can be used as a useful product.

Technology & Sustainability

Digital advancements:

- Piloted video analytics initiatives for generating alerts when someone enters plant without helmet to enhance the safety of employees.
- Aditya Birla Science and Technology Centre collaborating with EMIL to research new technologies and initiatives that can help reduce and reuse waste.

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The company is in collaboration with the Aditya Birla Science and Technology Center to work on how to reduce waste and find some innovative uses for the waste. An initiative to reduce GHG emissions: I have told you that in the environmental measure that I will talk about, the GHG emission has extensive reporting about the GHG emission. By adopting renewable energy, they are reducing greenhouse gas emissions. They are producing 155 megawatts of solar power and wind power, and because of this, their reliance on fossil fuel is decreasing, and they are trying to expand their renewable energy and further reduce the GHG emissions. Electrification of operation: they are transitioning to electric vehicles,

including many mining equipment, which are operating using fossil fuel in the Amelia, Subhadra, and Bandha projects; they are gradually transitioning to electric vehicles for their mining project. This will reduce their energy consumption and greenhouse gas emissions. Electrification initiatives will lead to improved efficiency and lower greenhouse gas emissions. Energy efficiency measures: These include replacing existing equipment with energy-efficient machinery, redesigning the mining and beneficiation processes and plants to reduce energy consumption and waste material. Adoption of state-of-the-art technology to reduce the energy intensity of the mining and processing operations. As a result of all their initiatives, the scope 1 emission, that is the direct emission from the different operations, they have been able to reduce 10 percent Scope 1 emission in the year 2023 2024. Scope 2 emissions, indirect emissions from energy consumption: The company continues to optimize energy efficiency by transitioning to renewable energy, and also adopting energy-efficient machinery and processes, which will decrease their electricity consumption and scope 2 emissions. Coming to Scope 3 emissions, which are about the value chain emissions. EMIL has conducted extensive scope 3 screenings across its value chain and reported on 9 categories of scope 3 emissions.

Initiatives to Reduce GHG Emissions

Renewable Energy Adoption

- 155 MW of solar and wind power generated -reduce reliance on fossil fuels.
- Expansion of renewable energy capacity across operational sites.

Electrification of Operations

- Transitioning to **electric vehicles** for mining projects such as Amelia, Subhadra, and Bandha.
- Electrification initiatives led to improved efficiency and lower emissions.

Energy Efficiency Measures

- Replacing existing equipment with **energy-efficient machinery**.
- Redesigning mining and beneficiation processes to reduce energy consumption and waste.
- Adoption of **state-of-the-art technologies** to reduce energy intensity of operations.

Dr. Khurshid

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GHG Emissions

Scope 1 Emissions

- Direct Emissions: EMIL achieved **10% reduction in Scope 1**

Scope 2 Emissions: Indirect Emissions from Energy Consumption

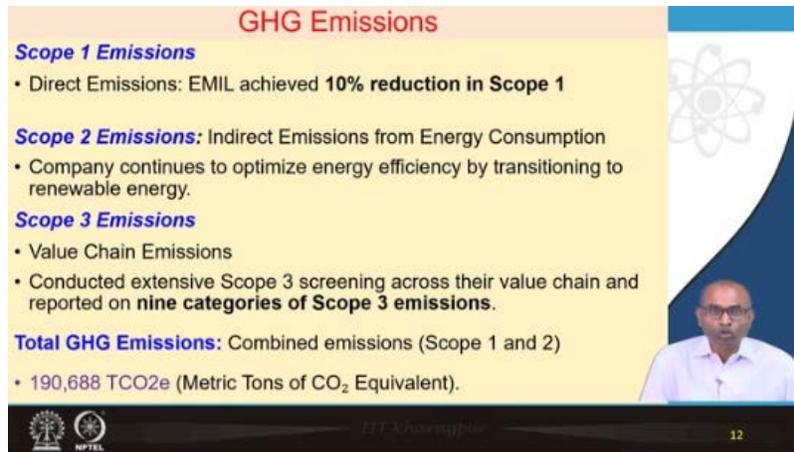
- Company continues to optimize energy efficiency by transitioning to renewable energy.

Scope 3 Emissions

- Value Chain Emissions
- Conducted extensive Scope 3 screening across their value chain and reported on **nine categories of Scope 3 emissions**.

Total GHG Emissions: Combined emissions (Scope 1 and 2)

- **190,688 TCO_{2e}** (Metric Tons of CO₂ Equivalent).



They are encouraging their value chain partners, suppliers downstream, to reduce the scope 3 emissions. The total greenhouse gas emission, including the combined emission of scope 1 and scope 2, which is applicable to their company, was 190,688 tons of CO₂ equivalent in the reported year. Carbon footprint management: EMIL is developing an automated energy management system and dashboard to track emission performance, and they are committed to aligning with the Science-Based Targets Initiative for climate action. The Science-Based Target Initiative (SBTI) is an international initiative where there is collaboration and innovation on the basis of science and technology to minimize greenhouse gas emissions. Operational innovations: implementing geofencing technology for efficient vehicle movement in mines and optimizing fuel. So, fuel is optimized, and emission reduction will also be there. Introducing a large water sprinkler to reduce dust emission during blasting, conserving energy in the process. Net Zero Emissions: They are trying to achieve net-zero emissions in a phased manner across all operations. Disclosures and Alignment: There is enhanced emission reporting, including NO_x, SO_x, and particulate matter. These are air pollutant reports. This air pollution disclosure is reported to the CPCB, or the state pollution control board, every year. Continue aligning the emission target with the global climate goal and Task Force on Climate-related Financial Disclosures (TCFD) recommendations. Circular economy integration: We have discussed about circular economy. It is done by expanding recycling and reuse initiatives, using renewable resources, reducing greenhouse gas emissions, and reducing waste material. You can shift the transition from a linear-based economy to the circular economy. The circular economy

will be highly beneficial for the environment and also for society. Community transformation initiative:

Initiatives to Reduce GHG Emissions

Carbon Footprint Management

- Developing an **automated energy management system** and dashboard to track emissions performance.
- Commitment to align with the **Science-Based Targets initiative (SBTi)** for climate action.

Operational Innovations

- Implementing **geo-fencing technologies** for efficient vehicle movement in mines, optimizing fuel use.
- Introduced **large water sprinklers** to reduce **dust emissions during blasting**, conserving energy in the process.

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Initiatives to Reduce GHG Emissions

- **Net-Zero Emissions:** A phased approach to achieve net-zero emissions across all operations.

Disclosure and Alignment:

- Enhance emissions reporting, including NOx, SOx, and particulate matter (PM).
- Continue aligning emissions targets with global climate goals and TCFD recommendations.

Circular Economy Integration:

- Expand recycling and reuse initiatives, reducing emissions from waste handling.

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So, the vermicomposting program has been adopted in the Singrauli district, Madhya Pradesh. EMIL trained farmers to produce high-quality vermicompost, sustainable agriculture support, promote modern farming techniques, and provide resources for enhanced agricultural productivity. EMIL conducted a pilot program covering two villages to encourage community-driven farming solutions. Employee volunteering: introduced schemes encouraging employees to actively participate in community upliftment activities. They are giving the training to the employee so that they can go to their community and initiate programs in the community for the betterment of the community. Certification, this is very, very important. As a part of the sustainability or the ESG, whether you are complying with many international standards, many of which are not statutory or mandatory, but the company can take the initiative to adopt those standards so that their

rating is improved. EMIL achieved ISO 27001 with respect to information security management. BCML achieved ISO 27001 certification, certified by the British Standards Institution. Nobel Ferro Alloys is accredited with the integrated management system, ISO 9001 for quality management, ISO 14001 for environmental management, and ISO 45001 for occupational health and safety management. So, these are the different certifications their group company has achieved. So, in this class, we have discussed the sustainability report, ESG report of a mining company that is Essel Mining and Industry Limited, which is a part of the Aditya Birla group of mines. Now, this is the last class. So, in 2-3 minutes, I will summarize what we have discussed in the NPTEL course. To summarise, the NPTEL course on "Sustainable Mining and Geo Information" has two different parts: one part is the geo information, how using geo information we can achieve the sustainability goals, we can achieve sustainability in the mining industry, and we can try to fulfill the 17th United Nations Sustainable Development Goal.



Community Transformation Initiatives

Vermicomposting Programs:

- Launched in the Singrauli district, Madhya Pradesh.
- Established nine vermicompost units and trained farmers to produce high-quality compost.

Sustainable Agriculture Support:

- Promoted modern farming techniques and provided resources for enhanced agricultural productivity.
- Conducted pilot programs covering two villages to encourage community-driven farming solutions.

Employee Volunteering:

Introduced schemes encouraging employees to actively participate in community upliftment activities.

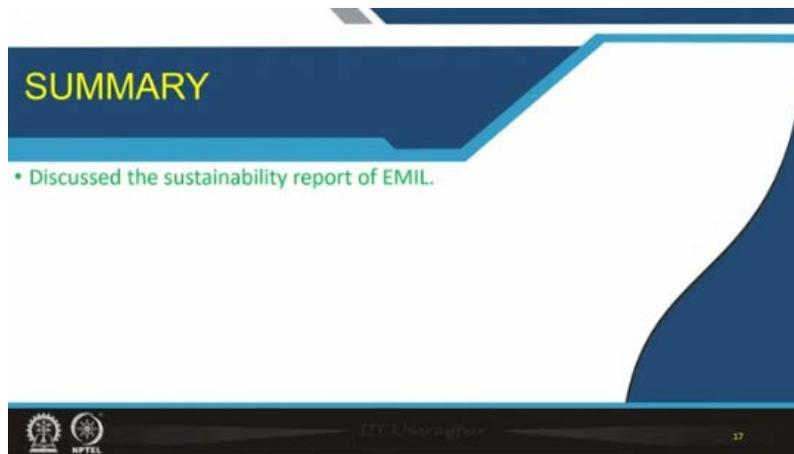
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Certification

- EMIL achieved ISO 27001:2013 certification for Information Security Management
- BCML achieved ISO 27001 certified by the British Standards Institutions (BSI).
- **Noble Ferro Alloys** unit accredited with Integrated Management System (IMS)
- ISO 9001:2015 for Quality Management
- ISO 14001:2015 for Environmental Management
- ISO 45001:2018 for Occupational Health and Safety Management

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Professor Behera has taken these classes on geoinformation, and the second part was on sustainable mining. So, here in the second part I have discussed about what are the different aspects of the sustainable mining, what is the definition, how this concept of sustainable mining can be used for the mining industry, then what are the regulatory framework which are supporting, which are encouraging for the mining to take initiative so that the mining industry will be becoming sustainable. We have discussed the EIA, EMP. We have discussed the different importance of mineral industries. Then we have discussed the impact of mining in terms of environmental impact and social impact. Then we have discussed the environmental life cycle analysis, and how it can be used for the mining industry. We have discussed the mine closure, which is an important part of sustainable mining. We have discussed the circular economy and how the concept of circular economy can be used for the mining industry. And then, there are different sustainable reporting and sustainable assessment systems. So, we talked about the different reporting standards, the GRI standard, and the Sustainable Mining Index. Then we have talked about the legal mandate for the benefit sharing by the mining company. We have talked about Corporate Social Responsibility, CSR, and we also talked about the ESG environment, social, and governance. So, all this during these 60 lectures; 30 lectures were taken by Professor Behera to discuss about the geoinformation and application of geoinformation to achieve sustainability in the mining industry and 30 lectures were taken by me where I talked about the mining industry, the impact of the mining industry, the sustainable development framework, sustainable development goal,

And what are the different components of sustainability, and how to do sustainability reporting? In the last class, we talked about a case study of the CSR reporting of the Tata Steel company. Today, we took another case study, that of Essel Mining and Industry Limited (EMIL). We discussed how they are conducting activities on sustainable mining, CSR, ESG, and other different compliances and disclosures that are part of sustainable development. I am sure that this course, Sustainable Development in Mining, is very useful to you. You must have learned a lot of things. Many participants, some are students, and some are from the industry. Particularly from my side, I have shown you many practical things—how, when you join the mining industry, you will use this knowledge in your industry when filing information for different compliances. This information will be very useful to you. I hope this course was informative and educational, and it was a learning experience for you. I wish you all the best in your future. There will be an interaction program where we will meet, and if you have any questions or need clarifications, we can have that interaction. I wish you all the best for your future endeavors. Thank you for registering or enrolling in this course. I also thank all the students who have registered to take the examination to receive a certificate.

I wish all of you the very best in your learning and in your future careers. Thank you very much.