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पर्यावरण दर्पण

PARYAVARAN DARPAN

BHARAT COKING COAL LIMITED
DHANBAD

VISIT OF CHAIRMAN, CIL TO BCCL ON 21-22 July 2021

MESSAGE

I am glad to learn that Environment Department of BCCL is going to release the 17th edition of "Paryavaran Darpan" on the occasion of 47th Foundation Day of Coal India Ltd. on 1st Nov 2021. I am sure this newsletter will provide a guiding light in creating awareness regarding environment management and sustainable development.

We must remember the famous quote, "We have not inherited mother earth from our forefathers; we have borrowed it from our children". It is our duty to act as custodian and use resources in a sustainable way that doesn't compromises the ability of the future generations to meet their needs. BCCL has always been firmly committed to protect environment and sustainable development.

Coal mining in a sustainable manner envisages producing the desired quantity of coal and at the same time returning more to the mother earth than taking away from her depths. Reducing Carbon and Ecological Footprint is the mantra for developing a sustainable business and I am glad that BCCL has taken commendable steps towards achieving this feat by converting the mined out areas to green ecosystems, encouraging carbon sinking through roadside plantation and green corridors in mining areas, continuous monitoring of air, water & noise pollution and its abatement measures, promoting ecotourism and promoting renewable energy through installation of solar panels. In this direction, BCCL has procured PM10 Analyzers, Mist Sprinklers, and Fog Canons etc.

I extend my best wishes to all concerned for their endeavour.

P M PRASAD
CHAIRMAN CUM MANAGING DIRECTOR
BHARAT COKING COAL LIMITED

MESSAGE

It gives me immense pleasure to know that the Environment department is going to release the 17th edition of Environmental newsletter "Paryavaran Darpan" on the occasion of the 47th Foundation day of Coal India Limited.

BCCL recognises importance of environment friendly mining. In addition to large scale plantation and other greening efforts, BCCL is making investment in infrastructure development in mining & environment technology to meet the objective.

Environmental awareness is an incredibly important part of our lives. In order to protect the sustainability of the planet, everyone needs to commit to becoming more environmentally aware. Bharat Coking Coal Limited is conscious about environmental concerns & awareness. The aim of publication of this Environmental newsletter "Paryavaran Darpan" is to create awareness for the protection of environment for future generation. The measures adopted by BCCL for curbing pollution shows the commitment of BCCL towards environmental protection.

I would like to congratulate the team of Environment department for their continuous efforts to improve the environmental conditions while adopting new technologies and wish the newsletter a grand success on completion of six years of its publication.

Moreover, Coal India Foundation Day is celebrated every year on 1st of November and it has a great significance for all the employees of CIL. I congratulate all the employees and other stakeholders of the company on the occasion of 47th CIL Foundation Day to successfully fulfil the energy need of the nation.

SRI. SAMIRAN DUTTA
DIRECTOR (FINANCE)
BHARAT COKING COAL LIMITED

MESSAGE

It gives me great pleasure to know that the Environment Department of BCCL is publishing seventeenth edition of its environment newsletter "Paryavaran Darpan" on the occasion of the 47th foundation day of CIL on 1st November 2021.

The famous quote by Gaylord Nelson "The ultimate test of man's conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard". This quote has a deep embedded meaning which we generally refer to as sustainable development. It is our collective and individual responsibility to preserve and tend towards the world in which we all live. But the question is that how many of us are ready to take this responsibility. Corona Pandemic has taught the humankind a nice lesson to limit our greed for resources. Nature is a shopping mall with limited resources and a defined regenerative power. The more we exploit it, the lesser resources we have at our disposal. It is just a matter of time when these resources will vanish. Prevention is always better than cure. BCCL aims at to be in the forefront of fight towards protecting environment and sustainable development. BCCL has been doing its best towards sustainable development with its initiatives to promote carbon sinking, land restoration, setting targets for land degradation neutrality, promoting renewable energy, eco-tourism etc. But there is still a great deal to be done.

BCCL's environment newsletter "Paryavaran Darpan" has been successful in sharing all the environmental initiatives taken by BCCL and providing a platform to spread awareness towards environment amongst its stakeholders. I congratulate the environment department for their exemplary work and motivate them to keep working with the same enthusiasm.

In the journey of protecting our beautiful environment, I would like to quote, "The earth will not continue to offer its harvest, except with faithful stewardship. We cannot say we love the land and then take steps to destroy it for use by future generation."

KUMAR ANIMESH
CHIEF VIGILANCE OFFICER
BHARAT COKING COAL LIMITED

MESSAGE

It gives me immense pleasure to see that the Environment department of Bharat Coking Coal limited has always realized the importance of restoring our natural environment, for it is our best bet to secure the future of humans and their relationship with their surrounding environment. BCCL is committed to do mining in sustainable manner and maintain the ecological footprint.

We always give our best efforts to restore the maximum mined out degraded land back to its best recoverable form. Thus, an intervention has been done in the form of Ecological restoration to speed up the recovery of degraded land which has shown exemplary results in restoring the degraded lands by attracting bio-diversity, high levels of carbon sequestration within a short span of time. In the year 2021-22, BCCL is carrying out the afforestation /bio-reclamation work over 90 ha by plantation of more than 1.83 lakh plants including plantation along the transportation routes in Jharia coalfield which will help in revitalizing our surrounding and will set an example of green mining zone.

BCCL is presently looking towards the creation of carbon sink through nature-based programme. Thus, on the eve of Vriksharopan Abhiyan 2021 that was launched by Ministry of Coal, BCCL had carried out plantation and distribution of saplings to the public for plantation at different locations like parks, private lands, residential Areas etc. On a single day, BCCL has planted 17,570 plants at 58 different sites and distributed 16,500 saplings to the locals. This initiative by BCCL will result in increase of our share in forest cover, enhance contribution to India's commitment in COP-21 and will create a new sink for negative carbon. Eco- parks over mined out degraded land like Ashok Vatika, Govardhan Vatika & Parasnath Udhyan etc. are being developed in command area of BCCL which is a major step towards restoring land for the use of masses.

Further, BCCL has also introduced new technology and infrastructure in the form of solar projects, PM_{10} Analyser, truck &trolley mounted fog canon and mist sprinklers. This will help company to move towards the vision of sustainable approach of mining.

I am delighted to know that the Environment department is releasing the 17th issue of its newsletter "Paryavaran Darpan" on the occasion of 47thFoundation Day of Coal India Limited and accolades for holding the flambeau of Environment bright and high at all operational levels. No company can reach its greatness without ensuring that the employees and communities are equal partners in its prosperity and success.

JAI PRAKASH GUPTA
DIRECTOR (TECHNICAL), PROJECT & PLANNING
BHARAT COKING COAL LIMITED

MESSAGE

I feel immense pleasures in sharing my thoughts through the Environment Newsletter of Bharat Coking Coal Limited (BCCL) "Paryavaran Darpan". To start with the one the most important global event related to Environment is going to be held from 31st October 2021 to 12th November 2021 in Glasgow, Scotland i.e. COP-26. The event is quoted here as it is a Global discussion on Climate Change. We as one of the Prime Energy providers of our country are always key part of this discussion and major policy formulations of future.

BCCL has also upped the responsibilities of Environment by establishing a robust self-monitoring system by initiating the process of installation Forty (40) Online PM10 Analyzers. Soon, Continuous Online Ambient Air Quality Monitoring System (CAAQMS) with more analyzers ($PM_{2.5}$; SO_2; NOx; CO) will also strengthen the real time monitoring of Air quality not only in our mining area but for Dhanbad also. We have also strengthened our control measures by procurement of Truck and Trolley Mounted Fog Canons. Apart from these initiatives, Biological Reclamation where BCCL is always committed to improve has also steadily moved ahead by adding an Area of 90 ha in FY 2021-22.

After the two waves of Corona crisis the Country requires surplus energy and keeping a balance between fulfilling the needs of today and preserving the Environment is a critical job ahead. Therefore, the way forward needs planned today onwards. Some key steps in this direction would be renovating our Old Coal Washeries and establishing new one with low ash product. High Capacity Underground Mines could cater well with being free from the problems of land degradation associated with opencast mines. Creating a viable and conducive scenario for operation by offering closed mines to MDO is another step towards sustainable mining. Hopefully, BCCL like always will keep working and improving the areas that matter the most in Future Environment.

I Congratulate Environment Department for the 17th Issue of Paryavaran Darpan and wish it all success.

CHANCHAL GOSWAMI
DIRECTOR (TECHNICAL), OPERATIONS
BHARAT COKING COAL LIMITED

संदेश

कोयला राष्ट्र के विकास के लिए अत्यंत आवश्यक है जिसकी सतत् रूप से आपूर्ति हेतु कोल इण्डिया एवं बीसीसीएल निरंतर प्रयासरत हैं। कोयला खनन के कारण पर्यावरण पर भी अस्थायी प्रभाव पड़ता है परन्तु सामाजिक व आर्थिक स्तर की बेहतरी में योगदान करता है और इस तरह हम सभी के जीवन को प्रभावित करता है। कोयला खनन के प्रभाव वायु, जल व भूमि पर आता है और इन प्रभावों को निम्न करने हेतु बीसीसीएल प्रयासरत है।

वायु प्रदुषण को निम्न करने के लिए निरंतर पानी द्वारा छिडकाव तो पहले से ही अपनाया जा रहा है इसके साथ साथ अब मिस्ट स्प्रिंकलर तथा फॉग कैनन भी उपयोग में लाये जा रहे हैं। वायु, जल व ध्वनि प्रदुषण की जाँच नियमित रूप से तो करायी ही जाती है साथ ही वायु प्रदुषण का ससमय स्तर मापने के लिए बीसीसीएल के कार्यक्षेत्र में पीएम $_{10}$जाँच यन्त्र लगाये जा रहे हैं।

ओबी डंप व उत्खनित भूमि को हरे भरे वनों में परिवर्तित करनेवायु , प्रदुषण में कमी लाने व धनबाद क्षेत्र में हरियाली बढाने के लिए भी बीसीसीएल निरंतर प्रयासरत है और इसके लिए इस वर्ष 90 हेक्टेयर क्षेत्र में वृक्षारोपण कराया गया है साथ ही 2148 वृक्ष सड़कों के किनारे लगाये गए है। इसके अतिरिक्त अस्थायी ओबी डंप पर घास के माध्यम से हरियाली बढाने के प्रयास किये गए हैं।

पर्यावरण के प्रति जागरूकता और वृक्षारोपण को प्रोत्साहन के उद्देश्य से बीसीसीएल कोयला मंत्रालय के अंतर्गत ,गत वर्ष की भांति इस वर्ष भी वृक्षारोपण' अभियान 'का आयोजन किया गया जिसमे सभी क्षेत्रों में वृक्षारोपण के साथ साथ आम जन को भी पौधे उपलब्ध कराये गए। अपने खनन क्षेत्रों के निवासियों की बेहतर जीवन शैली व हरियाली के लिए ईको पार्कों की स्थापना पर-भी ज़ोर दिया जा रहा है।

पर्यावरण के साथ-साथ बीसीसीएल सामाजिक विकास पर भी आवश्यक कदम उठाता है। इसी उद्देश्य से कौशल विकास और रोज़गार सृजन के लिए समय समय पर-स्थानीय लोगों के लिए विभिन्न प्रशिक्षण का आयोजन किया जाता है। वैश्विक महामारी, COVID- के समय में सामाजिक दायित्व के निर्वहन 19हेतु धनबाद में जन सामान्य की विभिन्न रूप से सहायता की है। बीसीसीएल ने अपने केन्द्रीय चिकित्सालय को COVID- 19 उपचार के लिए समर्पित किया है जहाँ से सैंकड़ों COVID- 19रोगी स्वस्थ हुए हैं।

मुझे अत्यंत प्रसन्नता है कि कोल इण्डिया के 47$^{वे}$ स्थापना दिवस के शुभ अवसर पर पर्यावरण के प्रति जागरूकता लाने वाली बीसीसीएल की पर्यावरण पत्रिका **'पर्यावरण दर्पण'** का 17$^{वाँ}$ संस्करण प्रकाशित हो रहा है। इसके लिए मैं पर्यावरण विभाग को बधाई देता हूँ।

मैं पुनः आप सभी को 47$^{वे}$ कोल इण्डिया स्थापना दिवस की हार्दिक बधाई देता हूँ ।

पी. वी. के. आर. मल्लिकार्जुन राव
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भारत कोकिंग कोल लिमिटेड

सम्पादकीय

देश आजादी का अमृत महोत्सव मना रहा है एवं कोरोना महामारी से उबरते हुए विकास पथ पर तीव्रता से अग्रसर है । बढ़ती ऊर्जा आवश्यकताओं को पूरा करने के लिए भारत कोकिंग कोल लिमिटेड भी कृतसंकल्प है । हमारा संकल्प देश एवं समाज की बेहतरी का है और बेहतर पर्यावरण के लिए हम निरंतर प्रयत्नशील है।

"हमें पृथ्वी अपने पूर्वजों से विरासत में नहीं मिली है,
हम इसे अपने आने वाले पीढ़ी से उधार में लेते है"

यदि हमें अपने भावी पीढ़ियों के लिए एक स्वस्थ पृथ्वी छोड़ना है तो हमें अपने आचार-व्यवहार को इसके अनुकूल बनाना होगा । पर्यावरण-अनुकूल उपायों के माध्यम से कार्बन, जल एवं पारिस्थितिक तटस्थता हासिल करने का लक्ष्य रखकर हमें अपने बच्चों को स्वस्थ धरा उपलब्ध कराना है ।

जिस प्रकार स्वच्छता अभियान में जन-साधारण की भागीदारी से आशातीत सफलता प्राप्त हुई है, उसी प्रकार पर्यावरण संरक्षण में भी सबकी भागीदारी अपेक्षित है । उज्जवला योजना के समुचित उपयोग से धनबाद क्षेत्र के रसोईयों में कोयला एवं लकड़ी के उपयोग से बचा जा सकता है । सडकों के रख-रखाव, सार्वजनिक परिवाहन का अधिक उपयोग एवं खाली स्थानों पर वृक्षारोपण एक बेहतर पर्यावरण के उद्देश्य की प्राप्ति में सहयोग हो सकते है ।

भारत कोकिंग कोल लिमिटेड कार्यक्षेत्र में नयी तकनीकों को आत्मसात करते हुए धूल दमन के लिए मिस्ट स्प्रिकलर का प्रयोग किया जा रहा है एवं फ़ाग कैनन भी लगाए जा रहें है। विभिन्न क्षेत्रों के पर्यावरण के दर्पण के रूप में कुल 40 आनलाइन पीएम 10 लगाए जा रहे हैं ताकि क्षेत्र के सभी भागीदार वर्त्तमान स्थिति को जाने एवं अपनी जिम्मेवारी का निवर्हन करें जिससे इस क्षेत्र को बेहतर पर्यावरण दिया जा सकें ।

इस वर्ष भारत कोकिंग कोल लिमिटेड ने एक अच्छे वातावारण के लिए आधारभूत संरचनाओं के विकास पर अधिक निवेश किया है तथा वृक्षारोपण में भी बढ़ोतरी की है । वैकल्पिक उर्जा संसाधनों के विकास पर भी कार्य किया जा रहा है । समाज-उपयोगी वृक्षारोपण एवं उद्यानों का विकास एक विकासशील मानसिकता के विकास में सहयोगी होगा ।

आइये, हम सभी अपने-अपने कार्यक्षेत्र में उत्कृष्टता ला कर कंपनी, समाज एवं देश की आवश्यकताओं को पूर्ण करें, एक स्वस्थ वातावरण के साथ ।

शुभकामनायों सहित

A PEEK INSIDE....

BRIEF NOTE ON AIR – WATER CARBON FOOTPRINT

Carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product." It is calculated by summing the emissions resulting from every stage of a product or service's lifetime (material production, manufacturing, use, and end-of-life). Throughout a product's lifetime, or lifecycle, different GHGs may be emitted, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), each with a greater or lesser ability to trap heat in the atmosphere. These differences are accounted for by the global warming potential (GWP) of each gas, resulting in a carbon footprint in units of mass of carbon dioxide equivalents (CO_2e).

As the concentration of greenhouse gas increases, the global warming effect becomes more pronounced. Carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) have been shown to dominate the well-mixed greenhouse gas (GHG), contributing 80% of the positive radiative forcing that drives climate change. CO2 has long been known as an important greenhouse gas, and CH4 is also an important greenhouse gas. The global warming potential of CH4 in 100 years is 25 times that of CO2, and the contribution rate to the greenhouse effect is approximately 22%. The N2O molecule is a powerful greenhouse gas that has a global warming potential 296 times greater than that of CO2. Global warming could have a significant impact on local and regional climatic regimes, which would in turn impact hydrological and water resources systems. The carbon cycle and its driving mechanisms are important components of current global change research.

The Intergovernmental Panel on Climate Change (IPCC), Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and relatedglobal greenhouse gas emission pathways has highlighted that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (high confidence), but these emissions alone are unlikely to cause global warming of 1.5°C.

Inland waters (streams, rivers, lakes and reservoirs) have been gradually recognized as important sources of greenhouse gas release into the atmosphere. River system connects the two carbon banks of land, air and sea. It is a key link in the global carbon cycle and the main channel for air and land-based carbonaceous materials to enter the sea. The river carbon cycle refers to the entire process of carbon sources from different sources in the air and terrestrial system entering the river network system in a variety of forms under the influence of machinery, biochemistry and human activities. Both Rivers and Inland waters are significant source of greenhouse gas emissions. It is estimated that aquatic systems contribute more than 50% to atmospheric CH4, and global river N2O emissions have gradually exceeded 10% of human

emissions. The greenhouse gas emissions of urban rivers are more significant compared with natural rivers. The N2O, CO2 and CH4 escaping from rivers are mainly derived from microbial processes such as microbial degradation, acetic acid fermentation, ammonia oxidation and the denitrification of sediments. As a reaction matrix, the increase in soluble inorganic nitrogen and soluble organic carbon stimulates microbial activity in the aquatic environment and promotes CO2, CH4 and N2O production.

Most significantly, the carbon footprint of our water use is likely growing for several reasons. Climate change is predicted to have numerous adverse effects on freshwater resources, rendering many available waters supplies far less reliable. With water demand growing and many local, low-energy supplies already tapped, water providers are increasingly looking to more remote or alternative water sources that often carry a far greater energy and carbon cost than existing supplies. Furthermore, the adoption of higher water treatment standards at the state and federal levels will increase the energy and carbon costs of treating our water and wastewater.

Water is perhaps the most vital ecosystem service that our natural environment provides. As the inevitable impacts of climate change become evident, our freshwater resources and the ecosystems they support will become respectively less reliable and resilient. Smart water policies Water conservation, efficiency, reuse and Low Impact Development (LID) strategies allow us to mitigate the worst aspects of global warming today and achieve energy and greenhouse gas emissions reductions, while the consequent improvements in water quantity and river health will provide a critical buffer as humanity and nature adapt to the climate of tomorrow.

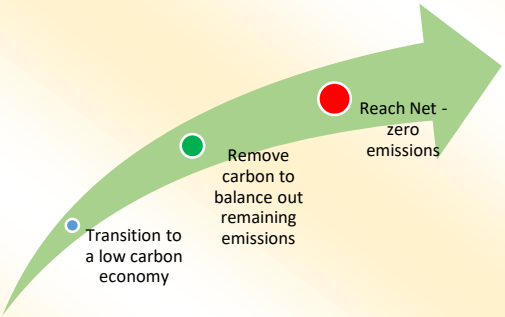
SHARATH KUMAR PALLERLA
Scientist-F/Director
International Cooperation,
Ministry of Environment, Forest and Climate Change
Government of India, New Delhi

Winner of 1st Prize in photography on World Environment Day

NET-ZERO EMISSIONS – DEMAND OF PRESENT & NECESSITY OF FUTURE

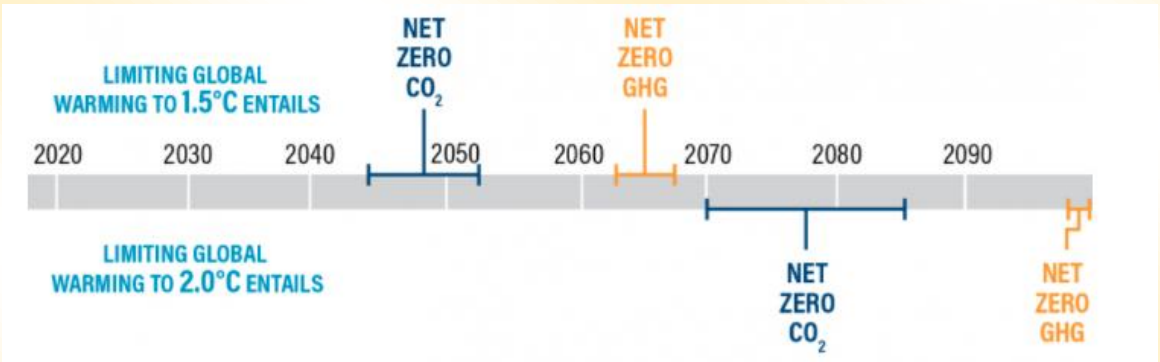
The Paris Agreement sets a long-term goal of achieving "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty." This concept of balancing emissions and removals is akin to reaching net-zero emissions or Climate Neutrality.

Net-zero emissions will be achieved when all GHG emissions released by humans are counterbalanced by removing GHGs from the atmosphere in a process known as carbon removal. First and foremost, human-caused emissions (fossil-fuel based) should be reduced as close to zero as possible. Any remaining GHGs should then be balanced with an equivalent amount of carbon removal, which can happen through things like restoring forests or using direct air capture and storage technology. Reaching net-zero emissions is akin to achieving "climate neutrality."



1. NEED TO REACH NET-ZERO EMISSIONS.

Under the Paris Agreement, countries agreed to limit warming well below 2 degrees C (3.6 degrees F), ideally to 1.5 degrees C (2.7 degrees F). Global climate impacts that are already unfolding under today's 1.1 degrees C (2 degrees F) of warming — from melting ice to devastating heat waves and more intense storms — show the urgency of minimizing temperature increase. Fig. 2 shows time line for reaching net-zero emissions as per Paris Agreement's temperature goals.



The Special Report on Global Warming of 1.5˚C, from the Intergovernmental Panel on Climate Change (IPCC), finds that if the world reaches net-zero emissions by 2040. , the chance of limiting warming to 1.5 degrees C is considerably higher. A comprehensive net-zero emissions target would include all GHGs, ensuring that non-CO2 gases are also reduced.

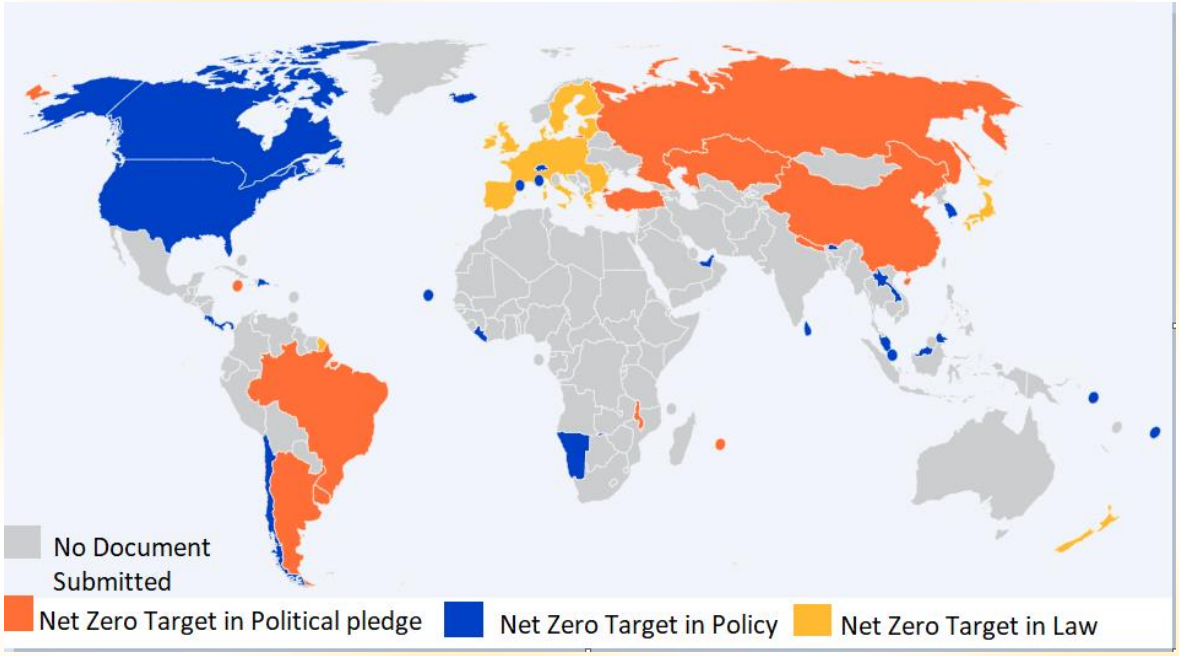


Fig. 4 shows map of net zero commitment status throughout the world.

1.2 ISSUES:

The IPCC sixth assessment report shows that the world will probably reach or exceed 1.5 degrees C (2.7 degrees F) of warming within just the next two decades. Whether we limit warming to this level and prevent the most severe climate impacts depends on actions taken this decade.

Only with ambitious emissions cuts can the world keep global temperature rise to 1.5 degrees C, the limit scientists say is necessary for preventing the worst climate impacts. Under a high-emissions scenario, the IPCC finds the world may warm by 4.4 degrees C by 2100 — with catastrophic results.

The critical issues behind this are:

1. Stronger National Climate Plans (NDCs) - more ambitious targets need to come forward with serious offers to curb emissions by 2030.

2. More Climate Finance From Wealthy Nations - Rich countries to step up with new climate finance and other types of development assistance for developing countries. They should also announce new pledges on finance for climate adaptation, especially for the Adaptation Fund, to ensure a balance of funding between mitigation and adaptation.

3. Creating More Equitable Food Systems - Countries and others should come forward with investments to produce food more sustainably; protect remaining ecosystems from agricultural expansion; reduce demand for land-intensive agriculture, such as by cutting food loss and waste; and restore degraded landscapes into productivity

4. Action From Non-state Actors - In addition to action from national governments, we'll need increased ambition from non-state actors, too, such as cities, businesses and more.

5. Reducing Non-CO2 Gases - Reducing Non-CO2 Gases methane emissions is vital to addressing climate change.

To avoid a calamitous future:

1) We are on course to reach 1.5 degrees C of warming within the next two decades.

2) Limiting global warming to 1.5 degrees C by the end of the century is still within reach, but requires transformational change.

3) Our understanding of climate science — including the link to extreme weather — is stronger than ever.

4) The changes we are already seeing are unprecedented in recent history and will affect every region of the globe.

5) Every fraction of a degree of warming leads to more dangerous and costly impacts.

RAJEEV KUMAR SINHA
RD, RI-II
CMPDI

Winner of 2nd Prize in Photography on World Environment Day

NEED FOR MINE CLOSURE PLANNING: COMMUNITY IS OF FOREMOST IMPORTANCE

Planning for mine closure must begin before approvals are given for the development of a mining project. A Conceptual Mine Closure Plan should be submitted at the feasibility stage must include plans for decommissioning and rehabilitation of each component of the mining area with cost estimates.

COMMUNITY AS THE MAJOR STAKEHOLDER:

Consultation and discussion with the communities directly affected by the mining project should be done also at the planning stage. This will allow identification of the role of all stakeholders and the expectations and interests of the landowners are taken into account and planned for earlier rather than towards the end of mine life, which is the case with existing projects, Furthermore, it is considered that consultation "throughout is paramount, assisted by participative approaches to forward planning so as to involve the community from the outset in addressing eventual closure and future options

An appropriate funding mechanism is in place to ensure sufficient funds are available for mine closure activities and that all decommissioning and rehabilitation requirements are complete. The plan must be reviewed every 5 years throughout a mine life to cater for changes in the overall mining plan, environmental reviews and needs and aspirations of the communities.

Consultation with all external stakeholders and their participation are vital for the successful closure of each mine and to ensure social and economic activities are maintained.

Adequate resources should be allocated to ensure the effectiveness of the process. Communities often become overly dependent on the mine to provide its needs. For example, as workers give up agriculture to work for the mine and as cash mine wages flow into a community, the result is that the community starts to "import" part of their food supply and their food security and self-sufficiency is reduced. Dependency is often increased because communities have often been "kept in the dark" about the mines activities and future and thus are not encouraged to plan for the future or better manage their own affairs.

Communities, with the help of the mine, local government and NGOs, can instead make efforts to plan for themselves – especially by having their representatives actively participate in the regional planning process. Most importantly they can make sure some of the mining benefits are used to build long term assets.

SOCIAL LIABILITY:

Examples of "social liability" are the following:

• To develop an environmental industry such as industrial waste treatment industry and recycling industry by making the best use of technology, facility and workers from the refining industry.

• To develop a tourist industry by using the space of the mining area.

• To relocate other facilities of the company (currently in other areas) within the perimeter of the mine operation.

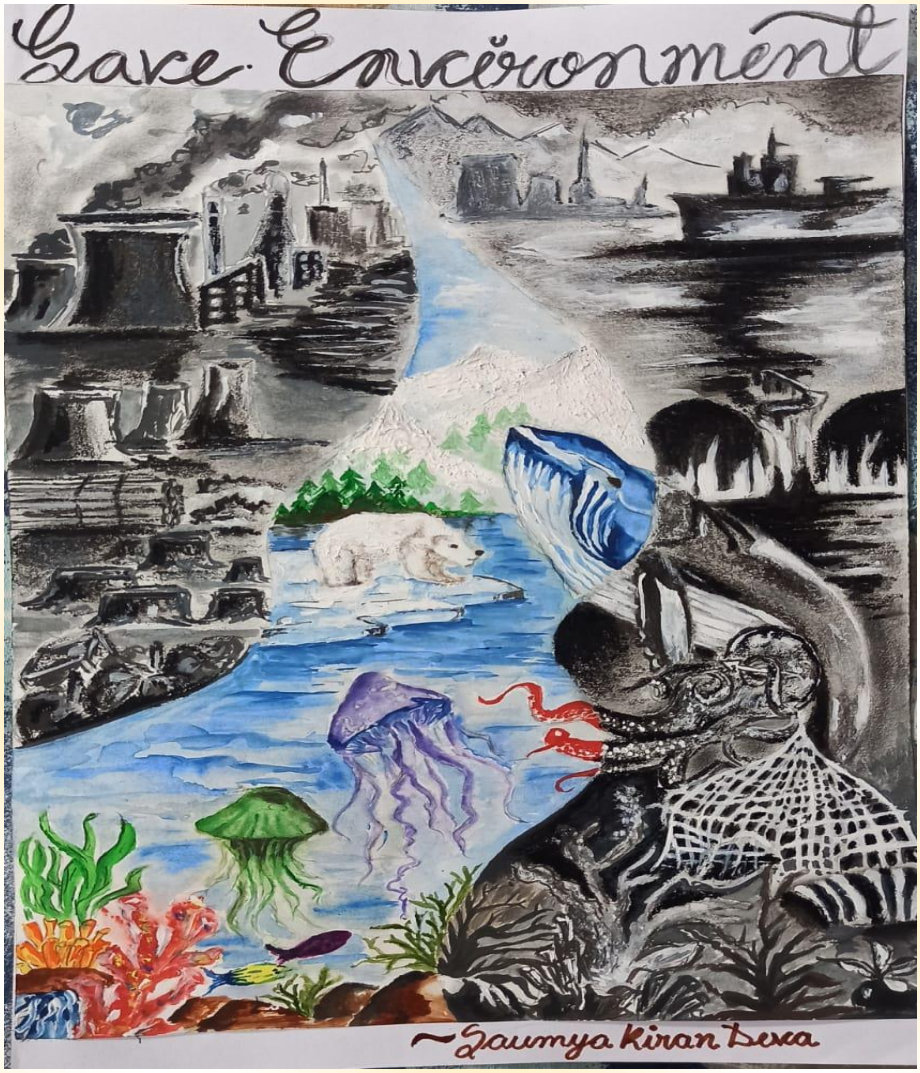
•. To create new jobs for the mineworkers within the framework of other companies or mines.

• To secure living standards of the mineworkers by increasing extra retirement allowance.

CONCLUSION:

The primary concerns for decommissioning and rehabilitation are to ensure public safety and health, environmentally stable conditions compatible with the surrounding environment are achieved and to minimize environmental impacts caused by mining. The overall objective is to have a social, economic and environmental sustainable development.

S.K.AGARWAL
Chief Manager (Min)
P&P Deptt, BCCL



Winner of 1st Prize in drawing on World Environment Day

ADDRESSING CLIMATE CHANGE

In the recent past, climate change has been the most talked about environmental phenomenon worldwide owing to the its growing impact leading to loss of several billions dollars of property and infrastructure and human health. Climate change destabilises the Earth's temperature equilibrium and has far-reaching effects on human being and the environment. During the course of global warming, the energy balance and thus the temperature of the earth change, due to the increased concentration of greenhouse gases, which has a significant impact on humans and the environment. There is more frequent and intense drought, storms, heat waves, rising sea levels, melting glaciers and warming oceans that can directly harm animals, destroy the places they live, and wreak havoc on people's livelihoods and communities. As climate change worsens, dangerous weather events are becoming more frequent or severe. Its impact is more likely to be felt in developing nations and poor people.

India, through a developing nation, has join hands with the world community to address the climate change issues. India is signatory to Paris Agreement on climate change and has submitted its Nationally Determined Contribution (NDC) to UNFCCC that encompasses several measures to address the climate change. Our Prime Minister has rightly advocated the concept of climate justice for India as we can't sacrifice the poverty alleviations programme for the sake of climate change. Reducing emission intensity upto 33-35% from 2005 level by 2030, increasing the share of renewables upto 40% and creation of additional carbon sink of 2.5-3.0 billion tonnes are priority targets of India's NDC. A number of adaptation and mitigation centric activities are planned and being implemented for reduction of greenhouse gas emissions. It is globally being planned to achieve carbon neutrality by mid of this century to keep the global temperature rise within 1.5^{o}C. The climate change has far reaching consequences on the global eco-system and carbon neutrality and eco-restoration are two watchwords for all the future development worldwide.

CIL and its subsidiaries has also joined hands with the Government of India to achieve to NDC targets. To start with, carbon footprint analysis has been undertaken and a carbon neutrality road map has been prepared. The carbon footprint of coal mining in CIL is less than 1% of country's emissions. Installation of solar power panels, undertaking energy efficiency measures, CBM/CMM extraction, appropriate LULUCF through reclamation of mined out areas and restoration of ecology and biodiversity are some of the activities being undertaken by CIL.

Dr. Vinita Arora and V.K. Pandey,
Chief Manager (Env), CMPDI

Winner of 2nd Prize in drawing on World Environment Day

CO_2 SEQUESTRATION ANALYSIS OF 3-TIER ECOLOGICAL RESTORATION SITES OVER MINED OUT DEGRADED LAND IN BHARAT COKING COAL LIMITED, DHANBAD

In coal mining process by open cast method, the vegetation on coal bearing land are cleared to expose the land surface resulted in land degradation & depletion of soil & vegetation cover causing ecological issues such as loss of forest cover, water regime, air quality and bio-diversity. Some of the major issues caused are:

- Destruction of permanent CO_2 sink by removal of vegetation cover;
- Release greenhouse gases like CO_2, N_2O, NO_x, CH_4, O_3 and CFCs in earth's atmosphere
- Release CO_2 from litter.
- Increase in the atmospheric temperature
- Increase in surface run-off & erosion
- Loss of habitat for soil organisms - bacteria, actinomycetes, fungi, algae, protozoa, and a wide variety of soil fauna - nematodes, earthworms, ants, insects etc.

To combat Land degradation , Depletion of Soil & vegetation cover caused in coal mining process , BCCL has adopted biological reclamation of degraded lands through 3-tier ecological restoration process which includes establishment of the floral components viz. Grasses, bushes and trees. This further leads to the restoration of various eco-logical components like food chain, habitat amelioration, degraded land productivity and the one most importantly act as carbon sink for atmospheric carbon by absorbing major GHG i.e. CO2. The Kyoto Protocol proposed that carbon reduction could take place by decreasing fossil fuel emissions, or by accumulating carbon in vegetation and soil of terrestrial ecosystem. (Maiti & Das, 2015)

Ecological restoration	Afforestation
	

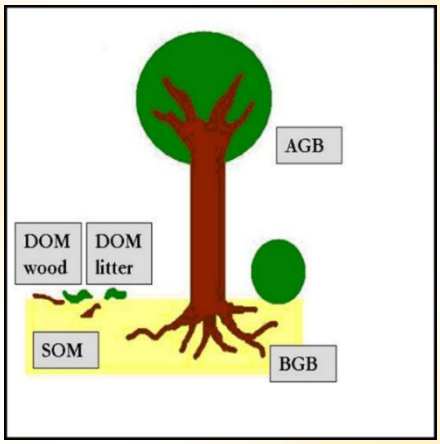
CARBON SEQUESTRATION

Carbon (C) sequestration is defined as "the process of increasing the C Content of a C pool other than the atmosphere". (IPCC, IPCC special report on Land use, Land use Change and Forestry: Summary for Policy makers, 2000).

All components of the ecosystem such as oceans, geological formations, plants and soil (Terrestrial Carbon sequestration) can act as 'carbon sink' by allowing more storage of C than its flow out of these systems as CO2.

Terrestrial Carbon sequestration is the process of (i) transforming atmospheric CO2 through photosynthesis into biomass components such as trees, shrubs, vegetation, and soil organic matter, and (ii) incorporation of biomass into the soil as humus. This leads to the effective storage of atmospheric CO_2 into the ground, forming a Carbon Sink, thereby reducing the amount of CO_2, which is a Green House Gas, in the atmosphere. Soil can contain approximately 75% of the terrestrial carbon pool three times more than the amount stored in living plants and hence it plays a vital role in the global carbon cycling.

COMPONENTS OF TERRESTRIAL CARBON SEQUESTRATION



The various components in which carbon dioxide can be sequestered in the Terrestrial systems are as follows:

- Transferring atmospheric CO2 through photosynthesis into biomass components such as trees, shrubs, vegetation (above-ground tree biomass (AGB) + Belowground biomass (BGB));
- Accumulation in plant litter (Dead Organic matter (DOM))
- Incorporation of biomass into the soil, as soil organic matter (SOM) and humus

CARBON SEQUESTRATION STUDY IN BCCL:

To quantify the impact of the efforts of the 3-tier ecological restoration, BCCL had engaged Indian School of Mines, Dhanbad for assessment of Carbon Sequestration at BCCL's eco-restoration model eco-restoration sites at Tetulmari, Sijua Area & Damoda, Barora Area in March 2015. These two 3-tier ecological restoration sites were taken up on two OB dumps in the mines of Bharat Coking Coal Limited (BCCL) at different locations in the Jharia coalfield in 2011. The site at Damoda was spread over the 02 different OB dumps. At the time of conducting the study, the sites were merely 03-04 years old.

The common native species planted at these ecological restoration sites, primarily are native species in-cluding Dalbergia sissoo, A Albizzia procera, Albiz-zia lebbek, Albizzia odoratissima, Cassia fistula, Ziziphus mauritiana, Aegle marmelos, Butea mono-sperma, Bauhinia variegate, Psidium guava, Termi-nalia arjuna, Gmelina arborea, Syzygium cumini, Ficus religiosa etc. The major grasses that were in-troduced were Cenchrus setigerus, Cenchrus ciliaris, Pennisetum pedicellatum, Bracharia, Bothriocloa, Brachiaria, stylosanthes hamata etc. In addition, bamboo species were also introduced on these sites, Damoda site is primarily dominated by bamboos with the concept of generation of higher biomass and litter accumulation.

METHODOLOGY

The various components of the terrestrial carbon sequestration pool were estimated by estimating the biomass followed by organic carbon in the different components separately and summation of the organic carbon and subsequently estimating the CO2 Sequestration as follows:

A. Estimation of biomass

a) TREE BIOMASS

Above ground tree biomass (AGB): DBH of individual tree species was divided into DBH classes in different groups. Mean DBH of trees in each diameter class of individual tree species was used to calculate the AGB accumulation, per average tree (in kg) of each diameter class through following biomass regression proposed for dry forest in India wit rainfall >900 mm/year. (Brown S. , 1997)

$$Y = exp\{-1.996 + 2.32 * ln(D)\}$$

Where, Y= aboveground biomass (kg)
D = Mean Diameter at breast height (DBH) of each tree species in each diameter class (cm)

Below ground Biomass (BGB): Equation used for estimation of BGB or RB (MacDicken, 1997)

$$BGB\ or\ RB\ (t/ha)\ =\ Average\ AGB\ (t/ha)\ *\ 0.2$$

The total AGB and RB of different tree species is summed up to calculate the total biomass of trees (t/ha) for each eco-restoration site.

Total biomass (t/ha) of trees = AGB + BGB

b) BAMBOO BIOMASS

In a three years old bamboo plantation 26.1 tons/ha for a green clumps density of 4000/ha. (Singh & Singh, 1999). A factor of 0.0065 t/ clump is derived for the study.

Further, as the study sites is mixed native plantation along with bamboos, therefore, the final corrected biomass of bamboos is considered 40% of the total density of the bamboos.

Corrected biomass of Bamboos (t/ha) = Density of bamboo clumps* 0.0065 * 0.4

c) LITTER & SOC BIOMASS

Litterfall samples were collected using the quadrat of 50 cm X 50 cm. The matured grasses at the sites were used as mulch and spread over the sites uniformly. The mulched grass within the quadrat was also included in the sample.

Carbon sequestered in form of litter was determined by multiplying a factor 0.04 with the average litter accumulated in t/ha.

Litter biomass (t/ha) = weight of biomass (kg) * quadrat area (m^2) * 10

B. ESTIMATION OF SOIL ORGANIC CARBON

Soil samples were collected from both the sites using the soil corer of 15 cm height. The soil samples were collected only from 0-15 cm as the OB dumps were devoid of the soil and the top layer over the OB dumps was formed due to the degradation of the sandstones and shale which comprises the OB removed from the coal mines.

Soil samples were used to determine the various physiochemical properties of the soil at these OB dumps like Bulk density (Bd), Field moisture, pH, Total Soil carbon (TSC), Inorganic carbon (IC); Available Nitrogen phosphorus, potassium, soil organic carbon, cation exchange capacity(CEC) and Base saturation.

Carbon sequestered in soil organic carbon was calculated using the following equation:

Mg C /ha = [%C * corrected B_d * d*10^4 m^2/ha]/100

Mg C /ha = Mega grams C per /ha

Bd = soil bulk density (Mega gram per m3)

d= soil depth (m)

% C = biogenic carbon

Estimation of the Organic Carbon

For ABG, BGB and bamboo, C sequestered is calculated by biomass generated multiplied to a factor of 0.5 (IPCC, 2006) and for litter, the factor is 0.4

Total Carbon pool = C Pool bio (AG+BG) + C Pool (bamboo) + C Pool litter + C Pool soil (0-15 cm)

Estimation of CO_2 Sequestration

The total carbon sequestered at each site can be determined as: (Shrestha & Lal, 2010)

CO_2 Sequestered by each pool can be determined by multiplied by a factor of (44/12) = 3.67

$$CO_2\ sequestered = CO_2\ sequestered_{(AG+BG+bamboo)} + CO_2\ sequestered_{litter} + CO_2\ sequestered_{soil\ (0-15\ cm)}$$

RESULTS

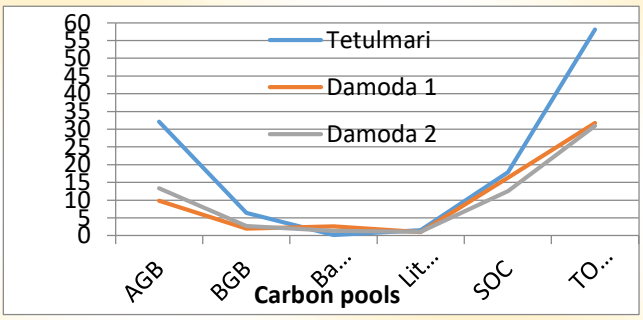
The floral diversity observed at the studied sites at the time of the study i.e. within 3-4 years of the establishment of the sites were as follows:

Number of species present at the sites

Name of the site	Tetulmari	Damoda 1	Damoda 2
No of shrub species	3	1	1
No of Grass species	8	9	11
No of tree species	22	23	23
Total no species	33	33	35

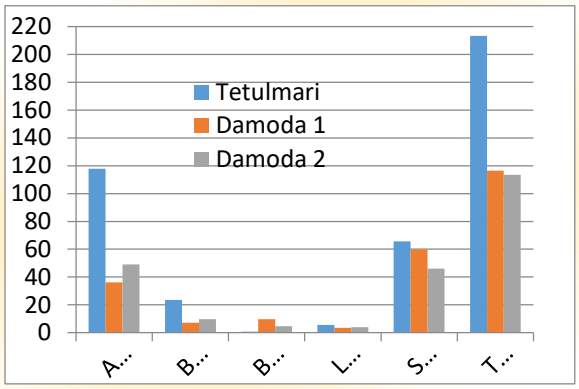
	Tetulmari	Damoda 1	Damoda 2
Density of tree species	1947	2500	2850
Density of total plants/ ha (< 1.5 m)	1359	1600	1400
Density of bamboo	147	2033	1000
Total vegetation density (no /ha)	3453	6133	5250

Name of the site	Tetulmari	Damoda 1	Damoda 2
AGB	32.115	9.84	**13.34**
BGB	6.425	1.97	**2.67**
Bamboo	0.191	2.64	1.3
Litter	1.508	0.98	1.092
SOC	17.89	16.33	12.54
TOTAL	58.129	31.76	30.942



Total carbon stored (t/ha) in different pool at these sites

Name of the site	Tetulmari	Damoda 1	Damoda 2
AGB	117.86	36.11	**48.96**
BGB	23.58	7.23	**9.80**
Bamboo	0.70	9.69	4.77
Litter	5.53	3.60	4.01
SOC	65.66	59.93	46.02
TOTAL	213.33	116.56	113.56

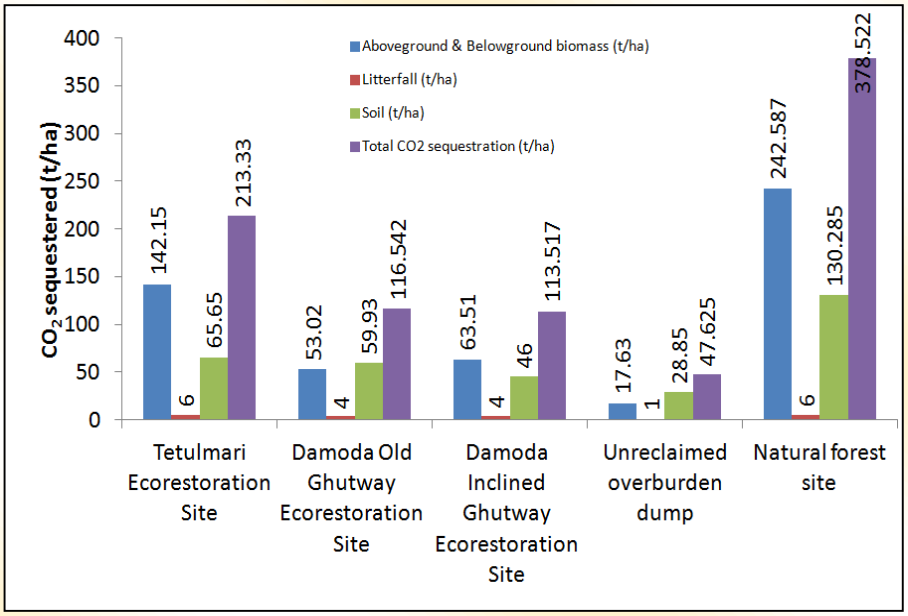


CO_2 sequestered (t/ha) in different pools at the Sites

BCCL has carried out the work of enhancement of biodiversity at the model ecological restoration site at Tetulmari, Sijua Area through FRI, Dehradun for two years. FRI, Dehradun in its report of project submitted in July 2018, has been observed that floral and faunal biodiversity has increased to a total of 103 plant species of which 37 are trees, 15 shrubs, 27 herbs, 9 grasses, 2 bamboo, 2 fern, 1 creeper and 10 climber species at the site. Among all, 80 recorded plant species have medicinal use in one or other way. The various faunal species observed over the project site birds (20), butterflies (14), insects (27), reptiles (1) and few of animals. In terms of quantification, CO2 sequestered at the site was 259.09 ton/ha.

Comparative analysis of CO2 sequestration of study sites, OB dump and forest site.

The CO_2 sequestration results were compared with the one of the barren OB dumps which has been left without any reclamation measures due to technical reasons (rehandling of the OB dump for further mining beneath or refilling of the OB in the mine voids at Katras Area of BCCL. However, the unattended sites may have some vegetation over due course of time due to pollination and other natural process. Similarly, a natural forest site was also identified adjoining the Jharia coalfield near Damoda to compare the results with the study sites. CO_2 sequestered (t/ha) at un-reclaimed OB dump & adjoining natural forest more than 100 years old.



CONCLUSION

- Eco-restoration is better alternative than afforestation leads to reinstatement of ecosystem in the degraded site.
- Minimizes pollution act as potential sink of CO2.
- The accumulation of C stock also increase with the gradual increase in age of the sites.
- After 5 years, CO2 sequestration in Tetulmari shall be in order of 350 t/ha and other sites in the range of 190-210 t/ha.
- High density of bamboos on Damoda sites results in comparatively lower C-sequestration.
- The comparatively lower rate of C S at Damoda sites may be attributed to the age of the dumps as the dumps at Damoda were younger in comparison to Tetulmari sites which results in the shorter span of the period for which the C sequestered in the soil.
- It has been observed that CS occurs in the soils of the barren dumps as well but at lower rates that the eco-restoration sites.
- A comparison was done with the amount of CO2 sequestered at the eco-restoration site and at a natural forest site and an un-reclaimed OB dump.

Damoda1, Barora Area site before Ecological restoration

Damoda1, Barora Area site after Ecological restoration

Tetulmari, Sijua Area site before Ecological restoration

Tetulmari, Sijua Area site After Ecological restoration

Raj Kumar, Chief Manager (Mining)
Harish Pal, Deputy Manager (Environment)

CELEBRATION OF WORLD ENVIRONMENT DAY 5TH JUNE 2021 AT BCCL

A plethora of Activities like Taking pledge to protect the environment, sapling distribution, plantation, release of 16th Edition of Paryavaran Darpan and various environment related competitions for employees and school children were organized on world environment day.

CELEBRATION OF VRIKSHAROPAN ABHIYAN ON 19TH AUGUST 2021 AT BCCL

Vriksharopan Abhiyan at AKWMC, Katras

Plantation Drive at HQ, Koyla Bhavan

MLA Smt Poornima Neeraj Singh at Bastacolla

Sapling Distribution in School

MLA Dr Ajay Poddar at CV area

Online Inauguration of MoC's Vriksharopan Abhiyan

MLA Shri Mathura PD Mahato at Kusunda

Sapling Distribution

ACTIVITIES AT A GLIMPSE

1. **Procurement and Installation of PM_{10} Analyser: 40 nos. of PM_{10} Analyser have been delivered and 04 nos. has been installed at CV and WJ Area.**

PM_{10} at NLOCP Siding, CV Area

PM_{10} at Dahibari Workshop, CV Area

PM_{10} at Dahibari Washery, CV Area

PM_{10} at Moonidih Colliery, WJ Area

2. **Commissioning of Fog canon In Bastacolla Area of BCCL for control of dust in June 2021**

3. **Workshop on Source Apportionment of Ambient Air Particulate Matter in Jharia Coalfield regions, Jharkhand: Status and Actions for Improvement in Air Quality through NEERI, Nagpur hosted by BCCL. This workshop was attended online by CIL and all its Subsidiaries.**

"WE WERE BORN TO HELP THE WORLD, NOT TO DESTROY IT"

An Environment is a natural world that encloses the Earth and forms a special geographical region in which humans, animals, plants and other living and non-living things exist. Our life is completely dependent on the environment because a healthy environment creates a healthy society. Environment means all-natural surroundings such as land, air, water, plants, animals, solids, waste, sunlight, forests and other things. Healthy environment maintains the balance of nature and at the same time helps to develop, nurture and develop all living things on earth. We should not challenge our natural resources and stop adding so much pollution or garbage to the environment. The components of the natural environment are used as a resource, but it is also exploited by humans to fulfil some basic physical needs and purpose of life. We should value our natural resources and use them within the natural discipline. Any disturbances in the balance of nature affect the environment completely which ruins human life.

Apart from the natural environment, there also exists a man-made environment which is related to technology, work environment, aesthetics, transportation, housing, utilities, urbanization etc. These man-made technological advances are degrading the environment in many ways which eventually disturb the balance or equilibrium of nature. The man-made environment affects the natural environment to a great extent which we all must protect together. We are risking our life along with the existence of future life on this planet. If we do anything wrongly outside the discipline of nature, it disturbs the whole atmosphere which means atmosphere, hydrosphere and troposphere.

Environment Pollution is not a community or city problem, it is a worldwide problem if it is not addressed properly, it may one day end the existence of life. Nothing can be said healthy in a day because what we eat is already affected by the bad effects of artificial fertilizers which reduce and weaken our body's immunity to fight disease caused by microorganisms. Therefore, anyone of us can be sick anytime, even after being healthy and happy. It is a major issue around the world that must be resolved by the continuous efforts of all.

For this, the Environment (Protection) Act (EPA) was enacted in 1986 with the objective of providing the protection and improvement of the environment. It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The EPA Act was enacted under Article 253 of the Indian Constitution which provides for the enactment of legislation for giving effect to international agreements. Article 48A of the Constitution specifies that the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 51A further provides that every citizen shall protect the environment.We must participate in the campaign to save our environment and to make peoples aware of all the bad habits that are causing the environment to collapse day by day. We should reduce the amount of waste, throw the waste properly in its place, stop using poly bags, and reuse some old things in new ways. We should use fluorescent lights, rainwater protection, water wastage reduction, energy conservation, minimum electricity usage, etc.

"Environment is no one's property to destroy; it's everyone's responsibility to protect."

Manisha Basu Roy
Manger (F), Vigilance Deptt.

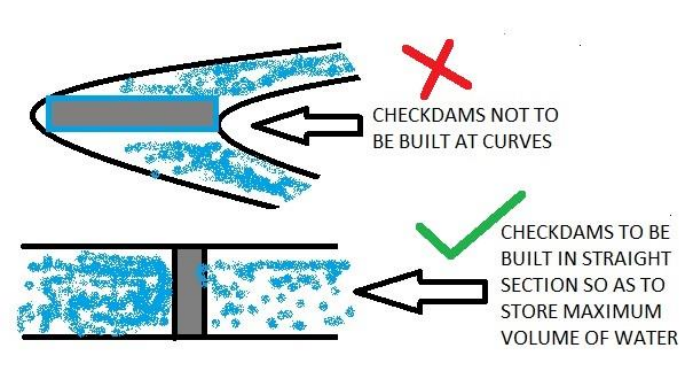
CHECK DAMS – DESIGN, CONSTRUCTION & ADVANTAGES

A **check dam** is a small dam, which can be either temporary or permanent, built across a river, tributary, channel or small drains. Similar to drop structures in purpose, they reduce erosion and gullying in the channel and allow sediments and pollutants to settle. They also lower the speed of water flow during storm events. Check dams can be built with logs, stone, or sandbags. Of these, the former two are usually permanent or semi-permanent; and the sandbag check dam is usually for temporary purposes. Also, there are check dams that are constructed with rock fill or wooden boards. These dams are usually used only in small, open channels.

Check dams range in size, shape and cost. It is possible to build them out of easily available materials. It is even possible to build some of these dams at a very little cost. The most important decision to be taken when building such a dam is its location. This decision is crucial, as the effectiveness of the dam depends on this. Compared with large-scale high-tech approaches to water management, check-dams appear to be a more appropriate technology for poor rural areas. For instance, in contrast to modern large dam projects, check-dams are a lower cost and less environmentally and socially disruptive alternative for irrigation.

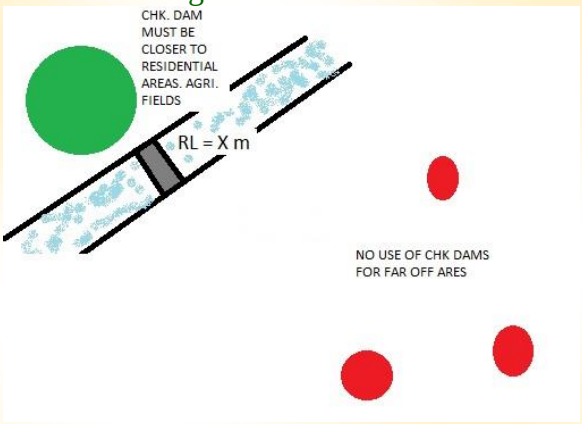
Check-dams do not submerge large tracts of land or alter river courses. In contrast to large dams and other, technology, skilled labour, financial resources and maintenance needed for check-dams are relatively minimal, making them more accessible to poor farmers. The initial investment made can usually be recovered in one or two seasons through the ensuing increases in agricultural production.

FACTORS TO BE CONSIDERED WHILE BUILDING A CHECKDAM-



- The structure should be able to store a high volume of rain-water over a long duration of time
- Should provide a long length of stored water
- There should be a high percentage of cropped area on either side of the length of stored water

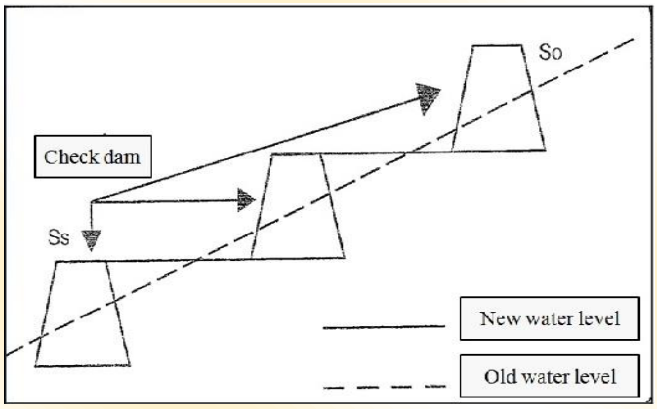
- Nearest to a residential area or village



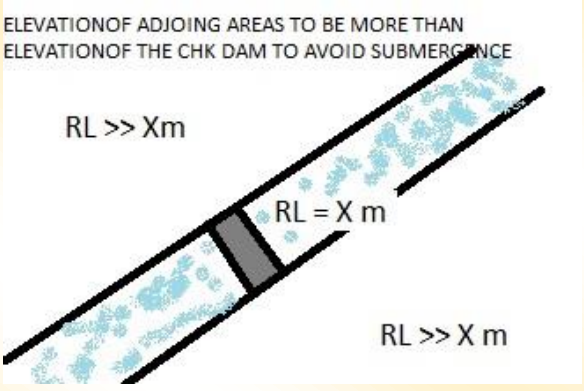
- Minimum risk of submergence of cropped lands and residential areas during flash floods
- Should have a high cost-benefit ratio
- Channel width must be narrow at the site where check dam is to be built

DESIGN PARAMETERS –

- ***Drainage area, gradient, and velocity:*** When deciding which application to install, the size of the area to be drained, the gradient or slope of the ditch, and anticipated high velocity runoff must all be considered.



- ***Spacing:*** Check dams should be spaced so that the toe of the upstream check dam is never lower than the top of the overflow of the next downstream check dam.
- ***Height:*** The centre of the check dam should be 6 to 10 inches lower than the top of the outside edge to form a weir for the overflow. The top of the outside edges should be at least 6 inches lower than the roadway, banks, or back slope to prevent water from flowing onto the roadway or undercutting the banks.



- ***Anchoring and stabilization:*** Undercutting shall always be considered, regardless of the type of check dam being used. For the installation of sediment retention fiber rolls, a trench of 3 to 5 inches deep shall be dug to lay the roll in. Excavated soil shall be placed on the upstream side of the wattle and compact. The fiber wattles shall be anchored with wood stakes according to manufacturer's recommendations to properly secure the wattles in the trench.

ADVANTAGES OF A CHECK DAM-

- They store surface water for use both during and after the monsoon
- Help in ground water recharge of the area
- Raises the water table in the area
- Availability of water ensures the increase of agricultural yield by multi-cropping
- Check dams can also be used for pisciculture
- Stores water for nearby residential areas
- Coarse and medium-grained sediment from runoff tends to be deposited behind check dams
- Extra nutrients, phosphorus, nitrogen, heavy metals, and floating garbage are also trapped or eliminated by the presence of check dams, increasing their effectiveness as water quality control measures

Thus, a check dam either filters the water for sediment as it passes through the dam or retains the water, allowing the sediment to settle while the water flows over the dam and accrues the above mentioned benefits in a cost effective way.

Suraj Kumar,
Asst Manager (Env),
Kusunda Area

Winner of 3rd Prize in drawing on World Environment Day

CARBON FOOTPRINT AND WHY WE SHOULD ALL BE VERY ALERT & CONCERNED ABOUT IT

What is Carbon Footprint?? It is the amount of greenhouse gases (GHG) and specifically carbon dioxide emitted as a result of a person's daily activities like cooking, consumption of electricity, while manufacturing a product or via emissions through industries & transportations during a given period of time. Human activities like burning of fossil fuels, deforestation and cement manufacturing are main contributors to this rise in the amount of GHG.

Why we shouldn't ignore the consequences of rise in Carbon Footprints?? The rise of this carbon footprint is resulting in severe rise of Global Warming as these greenhouse gases basically traps the Sun's Heat during daytime and prevents the heat from escaping into outer space - post the sunset, which is severely increasing our Earth's normal temperature. Increase of Earth's temperature results in rise in sea-level which in-turn is resulting in frequent flash-floods, sudden killer heat waves, heat strokes, melting of mountain ice & frozen glaciers, unpleasant weather conditions, more & more forest fires, irregular disastrous weather situations like frequent cyclones , hurricanes . Other dangerous effects of rise in carbon-footprints across our globe is the rise of various newer & incurable transferable diseases as high-temperature facilitates tropical wet & summer-type of climate which provides better breeding phase to various disease spreading bacteria, fungus, zootropic viruses, insects, pests .

It is said in the first, oldest and ancient testament of mankind i.e. Rig Veda, in its 1/90/6 shloka that :-

मधु वाता ऋतायते मधु क्षरन्ति सिन्धवः।
माध्वीर्नः सन्त्वोषधीः ॥

Meaning :- Environment provides bliss to people leading their life perfectly. Rivers bliss us with sacred water and provide us health, night, morning, vegetation. Sun bliss us with peaceful life. Our cows provide us milk.

And then in Vrksayurvedah-5 :-

दश कूप समा वापी, दशवापी समोहनद्रः।
दशहनद समः पुत्रों, दशपुत्रो समो द्रमुः।

Meaning :- One step is equal to ten wells, one pond is equal to ten stepwells, one son is equal to ten ponds and one tree is equal to ten sons.

So it's now or never. It's high-time for us all to wake up and get our act together. If the same trend continues our future is very dull and then darker, hopeless and self-destructing. Heavy afforestation, halt on extensive urbanisation & deforestation, making 3 R 's the mantra of our life i.e. Recycle-Reform-Reuse, opting for sustainable use of resources, going for renewable sources of energy and pollution-free green energy - are our ideal weapons to save planet Earth and ensure it always stays habitable . It is the moral, social, ethical conscious duty of every educated individual & citizen of the nation to be alert-aware about these hard-facts and act from today - to reduce his or her individual GHG emissions or carbon-footprint contributions into our only living planet i.e. Earth. Prime Minister Narendra Modiji addressed a convocation ceremony at Pandit Deendayal Petroleum University (PDPU) on 21st November 2020 and said that - India has set a target of reducing the carbon footprint by 30-35%. He also said - efforts are on to increase the use of natural gas capacity four times during this decade, and work is also on to nearly double the oil refining capacity in the next five years.

Gourab Mondal
Technician Apprentice
RailTel Corporation of India Limited (RCIL)
Posted at Bharat Coking Coal Limited HQ

कार्बन-जल-पारिस्थितिक पदचिन्ह का अर्थ और सुधार के उपाय

मानव ने अपनी जीवनशैली को सुखद बनाने के लिए अनेक तरह के साधनों का विकास किया गया जिससे पर्यावरण पर बहुआयामि दुष्प्रभाव पड़ा | इसे "प्रदूषण" कह कर हमें वर्षो से सावधान किया जा रहा है | प्रदूषण के खतरे से हमे आगाह करने के लिए में सीएसआईआर ने अपनी मासिक पत्रिका विज्ञान प्रगति का "स्वास्थ्य संकट विशेषांक" वर्ष 1971 में ही प्रकाशित किया था |

उर्जास्त्रोत के रूप में पेट्रोल,डीजल,केरोसीन,कोयला,लकड़ी ईत्यादि का बड़े पैमाने पर उपयोग किये जाने से भारी मात्रा में कार्बन तथा उसके रासायनिक यौगिक मुक्त होकर हवा,जल और मिट्टी में मिलकर उसे जहरीला बनाते है | इसके साथ-साथ थर्मोकोल,पॉलीथीन,प्लास्टिक,सौन्दर्य तथा प्रिंटिंग के सामान और रासायनिक रंगरोगन के पदार्थ प्रदूषण के मुख्य कारक बनाते जा रहे है |

खुले में फेके जाने से ये पदार्थ मिट्टी और प्राकृतिक जल भण्डार में जहरीले कार्बनिक यौगिक मिला देते है जो अंतत: अन्न और साग-सब्जियों के माध्यम से हमारे पेट में पहुंच कर बीमारियाँ उत्पन्न करते है |

संक्षेप में कहे तो हमें सभी सुबह से रात्रि तक जिन वस्तुओ का प्रयोग करते है उनमें से अधिकतर कार्बन-जल-पारिस्थितिक तंत्र को दुष्प्रभावित करती है या सीधी भाषा में कहे तो भयानक प्रदूषण करती है |

कार्बन-जल-पारिस्थितिक तंत्र में सुधार के लिए कोयला,लकड़ी,पेट्रोल,डीजल,केरोसीन जैसे प्रदूषक पदार्थो का प्रयोग सिमित करते हुए अन्य साधनों की खोज करनी होगी | सरकार भी बैटरी से चलनेवाली कार /दोपहिया को प्रोत्साहित कर रही है जिससे पेट्रोलियम आधारित प्रदूषणकारी वाहनों को हटाया जा सके |

हमारे दैनिक जीवन में हम पॉलीथीन/प्लास्टिक/थर्मोकोल से बनी वस्तुओ का बहुत उपयोग हो रहा है | उपयोग के बाद खुले में फेकने के बजाय, इसे बक्से/थैले में इकट्ठा करके रद्दीवाले या सफाईकर्मी को देना चाहिए ताकि इसका उचित ढंग से निपटारे हो जाय | घर या ऑफिस के कचरे को जलाना भी अपराध की श्रेणी में आता है अत: किसी भी तरह के कचरे को जलाने से बचना चाहिए | अब तो रसोईघर/केंटिन के कचरे से जैविक खाद भी बनाई जा रही है | पॉलीथीन का प्रयोग कम करते हुए उसकी जगह कागज,जूट और कपड़े को वरीयता दी जानी चाहिए |

ऑफिस में कंप्यूटर-कबाड़,प्रिंटर-कार्ट्रिज और बेकार उपकरणों का नियमानुसार निपटारा किया जाना चाहिए तथा बिजली तथा पेट्रो-उत्पादों का खर्च घटाना चाहिए तथा सफाई-कार्यों के लिए पर्यावरण हितैषी वस्तुओं का प्रयोग किया जाना चाहिए |

लोग जिसका चीज का उपयोग नही कर पाते उसे कचरे का नाम दे देते है, जो इसका महत्त्व समझते है वे इसे संसाधन के रूप में सम्मान देते है | खेतो में पराली तथा अन्य अपशिष्ट चीजों को जलाने के बजाय उसके अभिनव उपयोग किये जा रहे है और जैविक खेती को अपनाया जा रहा है जिसे प्रोत्साहित करने की जरुरत है | तथाकथित कचरे के पुनर्चक्रीकरण के साथ उसके सदुपयोग करने पर ध्यान देने से प्रदूषण कम होगा और कार्बन-जल-पारिस्थितिक तंत्र में सुधार हो सकता है |

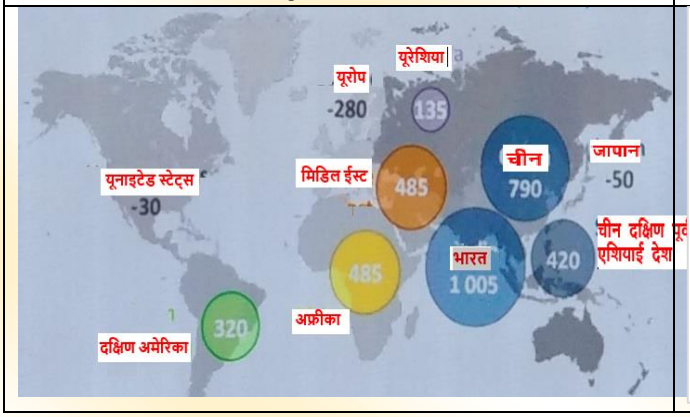
लोकेश कुमार,कार्यालय अधीक्षक
अध्यक्ष-सह-प्रबंध निदेशक सचिवालय
कोयला भवन

सतत विकास के लिए टिकाऊ ऊर्जा का महत्व एवं रणनीतियाँ

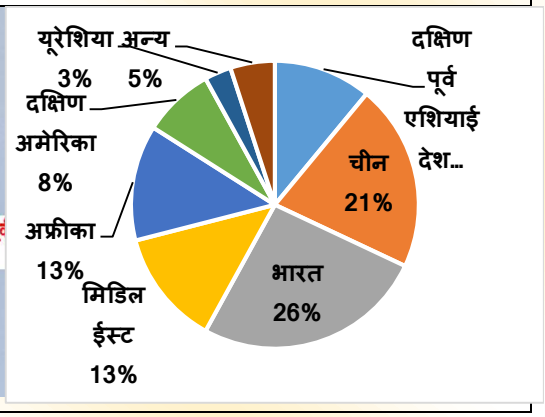
भारत जैसे विकासशील देश में आर्थिक विकास और मानव स्तर के वांछित स्तर को प्राप्त करने के लिए ऊर्जा अति आवश्यक है। देश के लिए आने वाले वर्षों में टिकाऊ प्रौद्योगिकियों के साथ-साथ टिकाऊ एवं सस्ती ऊर्जा की आपूर्ति अनिवार्यता भी है ।

भारत विकसित राष्ट्र की लीग में नहीं है, लेकिन 2040 तक के प्राथमिक ऊर्जा मांग के नए नीति परिदृश्य वृक्ष आरेख (चित्र संख्या 1) से स्पस्ट संकेत मिलते हैं कि भारत के पास 1005 Mtoe का लीड शेयर होगा। भारत, चीन और दक्षिण पूर्व एशियाई देश भविष्य की ऊर्जा मांग वृद्धि के इंजन होंगें जिनका शेयर 58% का होगा (चित्र संख्या 2)।

चित्र संख्या 1 : नए नीति परिदृश्य के अनुसार प्राथमिक ऊर्जा मांग के वृक्ष आरेख (2040)



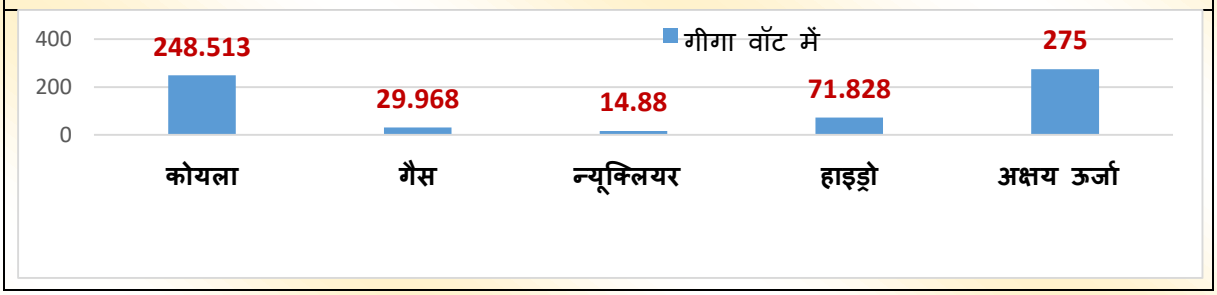
चित्र संख्या 2: वैश्विक विकास (2040)



भारत की बदलती ऊर्जा परिदृश्य

भारत मजबूत ऊर्जा मिश्रण की ओर बढ़ रहा है और सौर और पवन जैसे स्थायी ऊर्जा स्रोत पर ध्यान केंद्रित कर रहा है । ऐसा अनुमानित है कि 2026-27 के अंत तक भारत को स्वच्छ स्रोतों से अपनी स्थापित बिजली क्षमता का 56% प्राप्त कर लेगा (चित्र संख्या 3)। इस प्रकार भारत अपने आप को अक्षय ऊर्जा की ओर केन्द्रित करता दिखेगा ।

चित्र संख्या 3 : भारत की अनुमानित स्थापित बिजली क्षमता (2026-27)



यह इस लिए भी जरूरी है कि भारत उन 194 देशों में शामिल है जिन्होंने पेरिस एग्रीमेंट (कोप 21) को साइन किया । प्रतिज्ञा के रूप में भारत की ऊर्जा प्रणाली को अपने वर्तमान पथ से काफी बदलना होगा। इसकी प्रतिज्ञा के तहत 2030 तक भारत की संचयी स्थापित बिजली उत्पादन क्षमता का 40%, गैर जीवाश्म ईंधन से आने वाला है। । सहस्राब्दी एसडीजी लक्ष्य के एजेंडे में शामिल विभिन्न संकेतक (चित्र संख्या 4) के लक्ष्य को प्राप्त करने के लिए भी कदम बढ़ाने होंगें । एसडीजी लक्ष्य करने के लिए स्थायी

ऊर्जा की आवश्यकता होगी । यह ऊर्जा वह ऊर्जा है जो हम भविष्य की जरूरतों से समझौता किए बिना आज पैदा करते हैं, और स्थायी ऊर्जा सतत विकास से आएगी।

चित्र संख्या 4 : 2030 के एजेंडे के संकेतकों का एक सेट

चित्र संख्या 5 : सतत ऊर्जा के लक्ष्य एवं उदेश्य

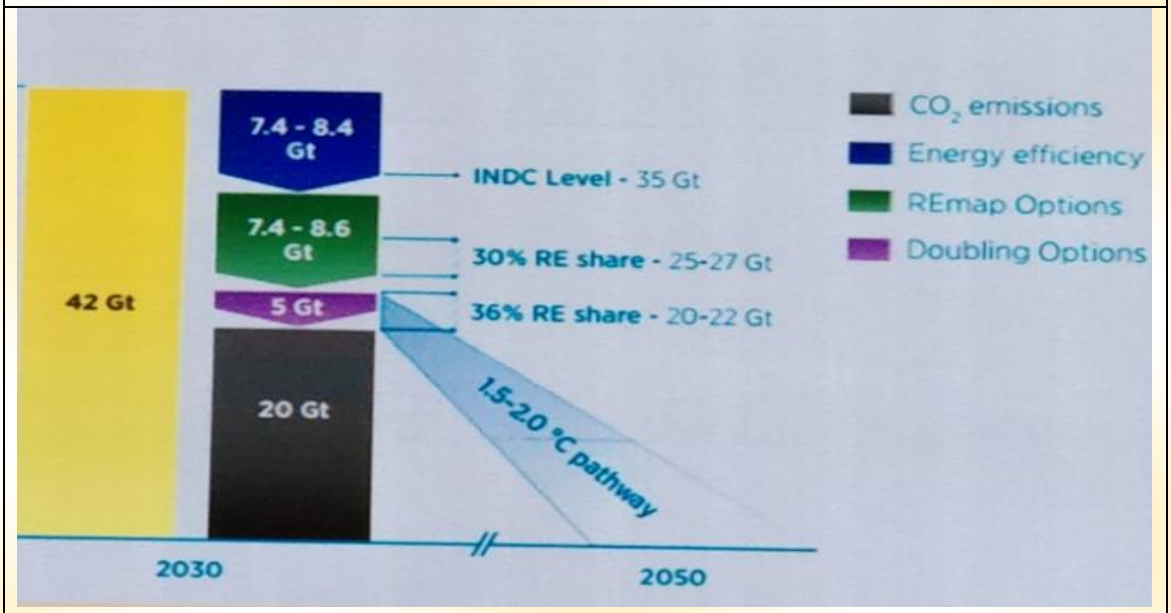
सौर, पवन, छोटे हाइड्रो, परमाणु के अलावा कोयला प्रमुख भूमिका निभाएगा। सतत विकास के लिए ऊर्जा अत्यंत आवश्यक है (चित्र संख्या 6) जिसका लक्ष्य सभी के लिए 2013 तक टिकाऊ ऊर्जा उपलब्ध कराना है। इस लक्ष्य की प्राप्ति के तीन उद्येश्य सार्वभौमिक पहुंच , ऊर्जा दक्षता एवं अक्षय ऊर्जा से संबन्धित हैं (चित्र संख्या 5) ।

चित्र संख्या 5 : सतत विकास के लिए ऊर्जा का महत्व

ऊर्जा और सतत विकास की एकीकृत रणनीति के तहत जलवायु परिवर्तन को संबोधित करना, वायु की गुणवत्ता में सुधार और सार्वभौमिक ऊर्जा को प्राप्त करना होगा। सतत विकास का यह परिदृश्य वायु प्रदूषण से निपटने (एसडीजी लक्ष्य 3), सार्वभौमिक ऊर्जा पहुंच को प्राप्त करने (एसडीजी लक्ष्य 7) और पानी के लिए निहितार्थों का आकलन (एसडीजी लक्ष्य 6) करते हुए कार्बन डाइ ऑक्साइड के उत्सर्जन (एसडीजी लक्ष्य 13) को कम करेगा । आवश्यकता है कार्बन डाइ ऑक्साइड के उत्सर्जन को कम करने की जिससे वैश्विक तापमान वृद्धि को 1.5॰ - 2॰ तक सीमित किया जा सके । यदि हम नहीं करते हैं तो हमें कठिनाइयाँ होंगी । 2030

में कार्बन उत्सर्जन 2010 के 30 गीगा टन प्रति वर्ष उत्सर्जन की तुलना में यह बढ़कर 42 गीगा टन प्रति वर्ष हो जाने की उम्मीद है (चित्र संख्या 7) ।

चित्र संख्या 7 : कार्बन उत्सर्जन (2030 व 2050)



विभिन्न शर्तों के अनुसार 2050 तक कार्बन उत्सर्जन को घटाकर 20 गीगा टन प्रति वर्ष करना होगा, तभी तापमान बृद्धि को 1.5॰ -2॰ तक सीमित रखा जा सकता है । इस लक्ष्य को प्राप्त करने के लिए मांग और आपूर्ति दोनों क्षेत्रों में ऊर्जा नवाचार आवश्यक है। स्मार्ट पहल ही इसका जबाब है जिसके द्वारा दक्षता में सुधार किया जा सकता है। ऊर्जा उत्पादकता को दो तरीकों से बढ़ाया जा सकता है। मांग एवं आपूर्ति के

तालिका १ : 121 प्राथमिक तकनीक

		दक्षता में सुधार	डीकार्बोनाइजेशन
आपूर्ति	विद्युत उत्पादन	निश्चित बिजली उत्पादन हेतु उच्च दक्षता वाले प्राकृतिक गैस उच्च दक्षता वाले कोयला आधारित बिजली उत्पादन उच्च दक्षता सुपर कंडक्टिंग पावर ट्रांसमिशन	कार्बन डाइ ऑक्साइड कैप्चर और स्टोरेज उन्नत परमाणु ऊर्जा उत्पादन इनोवटिव फोटोवोल्टिक बिजली उत्पादन
मांग	परिवहन	चतुर परिवहन प्रणाली ईंधन सेल वाहन प्लगइलेक्ट्रिकल वाहन / हाइब्रिड वाहन-इन-	परिवहन के लिए जैव ईंधन का उत्पादन
	उद्योग	इनोवटिव सामग्री, उत्पादन प्रसंस्करण / इनोवटिव लौह और इस्पात बनाने की प्रक्रिया	
	वाणिज्यिक	उच्च कला कुशल घर और भवन अगली पीढ़ी की उच्च दक्षता वाले प्रकाश उपकरण स्टेशनरी ईंधन सेल अल्ट्रा उच्च दक्षता वाले हीट पंप उच्च दक्षता वाले सूचना उपकरण और प्रणाली	

		HEMS / BEMS / स्थानीय स्तर की ईएमएस	
	लागत में कटौती	उच्च प्रदर्शन वाले बिजली भंडारण पावर इलेक्ट्रॉनिक्स हाइड्रोजन उत्पादन, परिवहन और भंडारण	कार्बन डाइ ऑक्साइड कैप्चर और स्टोरेज

हिसाब से 21प्राथमिक तकनीक को चिन्हित कर विद्युत उत्पादन, परिवहन, उद्योग, वाणिज्यिक एवं लागत में कटौती में वर्गीकृत कर इनोवसन की आवश्यकता के अनुसार दो भागों में क्रमसःदक्षता में सुधार एवं निम्न कार्बोनाइजेशन में बाँटा गया है (१ संख्या तालिका)

जरूरत है इनोवेसन की । इनोवेसन की पहली आवश्यकता है दक्षता में सुधार। इसके लिए नई ऊर्जा की रणनीतियाँ पर विचार करना होगा (तालिका 2)। दक्षता में सुधार के लिए या तो ऊर्जा सेवाओं का लाभ अधिकतम करना होगा या ऊर्जा सेवाओं की ऊर्जा लागत को कम करना होगा ।

तालिका 2 : नई ऊर्जा की रणनीतियाँ

	बिजली की परिवर्तनीयता	➔	हाइड्रोकार्बन की मांग को कम करना
	कोयले से तरल ईंधन	➔	सीबीएम, तत्रस्थ (insitu) कोयला का गैसीकरण, कोयले से द्रव में तब्दीली
	सौर / परमाणु	➔	हाइड्रोजन (गैर जीवाश्म)
	बायोमास + हाइड्रोजन (गैर जीवाश्म)	➔	3 से 4 गुना अधिक जैव ईंधन
	CO2 पृथक्करण (सेकुएस्ट्रेसन)	➔	ईओआर, बायोमास, मूल्य वर्धित उत्पाद

इनोवेसन की दूसरी आवश्यकता है - ऊर्जा सेवाओं का डीकार्बोनाइजेशन अर्थात कार्बन डाइ ऑक्साइड उत्सर्जन में कमी । सहस्राब्दी एसडीजी लक्ष्य पहचान करने से पहले के शुरुआती दिनों में लक्ष्य यह था कि 2025 तक सीओ 2 उत्सर्जन में 17% की कमी की जाए एवं ऊर्जा उत्पादन में दोगुना बृद्धि हो । यह लक्ष्य यह सुनिश्चित करने के लिए दिया गया कि पृथ्वी का तापमान औसत से 2 डिग्री सेंटीग्रेड तापमान से अधिक न बढ़े । इसे हासिल करने के उपाय को छह ग्रुप में वर्गीकृत किया जा सकता है जो निम्नलिखित है :-

अक्षय ऊर्जा की लागत में कमी :- हमारे देश में सौर ऊर्जा क्षेत्र में मॉड्यूलर की लागत में 80% की कमी और पवन टरबाइन की लागत में 30-40% तक की कमी आई है। इस प्रकार की लागत में कमी भविष्य में सुनिश्चित की जाए ।

अक्षय ऊर्जा तकनीकी प्रदर्शन में वृद्धि :- यदि अक्षय ऊर्जा 2050 तक प्रति वर्ष 12% की दर से बढ़ती है, तो यह ऊर्जा की आवश्यकता के 2/3 भाग प्रदान कर सकती है बाकी 1/3 भाग तो कोयला एवं अन्य जीवाश्म ईंधन (फोस्सिल फ्युल) से प्राप्त होगी। आवश्यकता है पावर क्षेत्र में एकीकृत नवीकरणीय ऊर्जा के लिए जाएँ, विमानन के लिए कम कार्बन ईंधन विकसित करें, नैप्टा आदि जैसे उच्च घनत्व ईंधन की जगह कम प्रदूषणकारी ईंधन का उपयोग करें। इस कार्य के लिए निजी और सरकारी क्षेत्र द्वारा संयुक्त अनुसंधान एवं विकास कार्य की जरूरत है ।

नई तकनीक का उपयोग : इंटरनेट ऑफ थिंग्स या IoT, का उपयोग जो कंप्यूटिंग डिवाइस पर आधारित एक प्रणाली है जो अद्वितीय पहचानकर्ता (यूआईडी) और मानव-की आवश्यकता के बिना एक नेटवर्क पर डेटा स्थानांतरित करने की क्षमता प्रदान करते हैं। 2020 तक आईओटी आपूर्ति और मांग श्रृंखला का हिस्सा होगा ऐसा अनुमान है। इसमें ब्लॉक चैन, मिक्रोग्रिड, स्मार्ट मीटर, बिग डाटा, अक्षय ऊर्जा, स्टोरेज आदि सन्निहित हैं ।

1. आवश्यकता होगी ऊर्जा स्टोरेज के लिए सप्लाइ चैन एवं ट्रांसपोर्टेसन चैन को सममावेश करने की। सप्लाइ चैन :- विद्युत उत्पादन, उच्च दक्षता प्राकृतिक गैस, उच्च दक्षता वाला कोयला प्रज्वलित शक्ति संयंत्र, कार्बन अवशोषण और भंडारण, अभिनव फोटोवोल्टिक उत्पादन, उन्नत परमाणु ऊर्जा उत्पादन । ट्रांसपोर्टेसन चैन :- इंटेलिजेंट ट्रांसपोर्ट सिस्टम जैसे ईंधन सेल आधारित वाहन, हाइब्रिड वाहन, परिवहन के लिए जैव ईंधन का उत्पादन ।
2. वाणिज्यिक साइड :- उच्च दक्षता वाले घर और भवन, अल्ट्रा दक्षता वाले हीट पंप, अगली पीढ़ी के उच्च दक्षता प्रकाश उपकरण (एलईडी), स्थिर ईंधन सेल, दक्षता बढ़ाने के लिए थर्मल पावर प्लांट में स्थिर ईंधन सेल, उच्च दक्षता सूचना उपकरण या साधन, उच्च प्रदर्शन वाले शक्ति भंडारण ।
3. A & T नुकसान को कम करने के लिए अधिक से अधिक इलेक्ट्रॉनिक्स और स्मार्ट ग्रिड का उपयोग ।

इनोवेशन की आवश्यकता पूर्ति के लिए दक्षता में सुधार व डीकार्बोनाइजेशन की आठ इनोवेटिव चुनौतियाँ चिन्हित की गई हैं ये निम्न हैं : -

1. स्मार्ट ग्रिड इनोवेशन :- भविष्य के ग्रिड की सक्षमता बढ़ाने के लिए सस्ती, विश्वसनीय, विकेन्द्रीकृत नवीकरणीय बिजली प्रणाली की आवश्यकता होगी ।
2. ऑफग्रिड अवस्था में बिजली की उपलब्धता के लिए नवाचार:- उन ऑफ ग्रिड प्रणालियों को विकसित करना जो घरों और समुदायों को सस्ती और विश्वसनीय नवीकरणीय बिजली ऑफ ग्रिड के समय भी उपलब्ध कराये ।
3. कार्बन अवशोषण :- बिजली संयंत्रों और कार्बन बहुल उद्योगों से शून्य सीओ 2 उत्सर्जन हो ।
4. स्थायी जैव ईंधन :- बड़े पैमाने पर उत्पादन करने के तरीके विकसित किया जाए जो कि परिवहन और औद्योगिक अनुप्रयोगों के लिए व्यापक रूप से सस्ती एवं उन्नत जैव ईंधन हो ।
5. स्वच्छ ऊर्जा तंत्र :- नए उच्च प्रदर्शन, कम लागत वाली स्वच्छ ऊर्जा सामग्री की खोज और उपयोग में तेजी लाने की आवश्यकता है ।
6. इमारत के हीटिंग और शीतलन में इनोवेशन :- हर किसी के लिए कम कार्बन हीटिंग और शीतलन सस्ती बनाना
7. सूर्य के प्रकाश को परिवर्तित करने की चुनौतियाँ : - सूरज की रोशनी को सौर ईंधन सेल में बदलने के लिए किफायती तरीके खोजने होंगें ।
8. विभिन्न उपयोगों के लिए ऑस्ट्रेलिया से हाइड्रोजन आयात करना

इन चुनौतियों के समाधान के लिए अर्थव्यवस्था में बदलाव की आवश्यकता है जो निम्न है : -

- उच्च उत्सर्जन वाले पारंपरिक ईंधन प्रणाली
- जीवाश्म ईंधन का कम होना

- संयुक्त ताप और ऊर्जा प्रणाली
- कम ऊर्जा उत्सर्जन की प्रणाली एवं कार्बन अवशोषण व भंडारण
- भविष्य के लिए बड़े से बड़ा परमाणु संयंत्र
- कम से कम उत्सर्जन के लिए अक्षय ऊर्जा, सूर्य, जल, जैव ईंधन, भूतापीय का मिश्रण

प्रत्यक्ष नियंत्रण ऊर्जा दक्षता को सुदृढ़ करने का एक महत्वपूर्ण पैरामीटर है। ऐसा देखा गया है सयंत्रों से ऊर्जा का सही अनुपात नहीं प्राप्त हो रहा है। जैसे कि ताप विद्युत संयंत्र की दक्षता केवल 36% है। इसका कारण पाइप, कोंडेंसर, जेनरेटर, बॉयलर द्वारा बिभिन्न नुकसान हो सकते है। अतः आवश्यकता है हम ऐसे चक्रों की तलाश करें जो अधिक से अधिक कुशल हो। इसके लिए जरूरी है उन्नत उत्पादन सेवाएं का खोज जिसे उच्च उत्पादन स्तर कायम कर व उन्नत कल-पुर्जा का उपयोग कर प्राप्त किया जा सकता है। हम आज उन्नत सुपर क्रिटिकल पावर प्लांट के लिए काम कर रहे हैं, यह दक्षता में सुधार करेगा और साथ ही उत्सर्जन को कम करेगा। जिसमें उच्च टरबाइन हैड, उच्च तापमान (740-760 डिग्री C), उच्च संपीड़न (कोमप्रेसन) अनुपात प्राप्त होगा। BARC, NTPC, BHEL जैसी कंपनियां उन्नत सुपर क्रिटिकल पावर प्लांट के लिए सामग्री विकसित करने के लिए काम कर रही हैं। इस टेक्नालजी के विकास से भारत इस तकनीक में पहली बार अगुवाई करेगा । कार्बन उत्सर्जन, कार्बन कैप्चर और कार्बन भंडारण के लिए उचित शोध की आवश्यकता है। भविष्य में हाइड्रोजन दहन के लिए अधिक से अधिक एक्सर्साइज़ की आवश्यकता है। अधिक से अधिक तरल ऑक्सीजन का उपयोग करने की आवश्यकता होगी । इसके लिए जरूरी होगा दक्षता बढ़ाने की जिससे देश को महत्वपूर्ण लाभ मिलेगा

कोयला बिजली उत्पादन का सबसे लचीला रूप है। USDOE (2018) के अनुसार - ऊर्जा मिश्रण से कोयला हटा देने से बुरे मौसम में विद्युत उत्पादन को खतरा हो सकता है । अतः आवश्यकता है स्वच्छ कोयला तकनीक की ।

स्वच्छ कोयला तकनीक (क्लीन कोल टेक्नालजी) : कोयला चूंकि अपरिहार्य है अतः स्वच्छ कोयला तकनीक का विकास अत्यंत आवश्यक है। कोयले को एक सक्षम व्यवहार्य ईंधन होने के लिए कोयले आधारित सनयन्त्रों से कार्बन उत्सर्जन कम होना चाहिए । हालांकि विगत 15 वर्षों से स्वच्छ कोयला तकनीककी बात हो रही है। इस तकनीकि में मूल रूप से सल्फर डाइ ऑक्साइड, नाइट्रस ऑक्साइड, धूल कण एवं अन्य प्रदूषक को नियंत्रित करना है साथ ही ग्रीन हाउस गैसों का उत्सर्जन में कमी लाना है । इसके लिए एकीकृत गैसीकरण संयुक्त चक्र (IGCC), अल्ट्रा सूपर क्रिटिकल बिजली संयंत्र एवं ऑक्सी ईंधन दहन, जैसे तकनीकी की बात हो रही है। सब-क्रिटिकल बिजली संयंत्र पर प्रतिबंध लगा दिया गया है। आज के समय में सूपर क्रिटिकल बिजली संयंत्र देखने को मिल रहा है तो भविष्य में उन्नत सूपर क्रिटिकल बिजली संयंत्र कार्य करने लगेंगें । अतः स्वच्छ कोयला तकनीक प्रदूषण के नियंत्रण का एक महत्वपूर्ण आयाम होगा । कार्बन डाइ ऑक्साइड कैप्चर और स्टोरेज एक विकल्प हो सकता है । इस पद्धिति के द्वारा ग्रीनहाउस गैस को वायुमंडल में सुरक्षित और स्थायी रूप से भंडारण कर इससे निजात पाया जा सकता है । जहाँ तक शून्य उत्सर्जन की बात है कार्बन डाइ ऑक्साइड कैप्चर और स्टोरेज के साथ साथ एचएलई (HLE) तकनीकि के उपयोग के साथ संभव है ।

HLE दक्षता बढ़ाने के लिए सुपरक्रिटिकल पेल्वराइज्ड दहन का उपयोग करता है एवं अल्ट्रा सुपरक्रिटिकल दहन दक्षता को 50% तक बढ़ा सकता है । 1% दक्षता में वृद्धि, उत्सर्जन में 3% की कमी लाएगा । HLE (400-GW क्षमता) को स्थापित करने से 6-बिलियन टन कार्बन उत्सर्जन की अतिरिक्त बचत होगी । लेवेलाइज़्ड़ बिजली लागत के आधार पर HLE, अल्ट्रा सुपर क्रिटिकल की तुलना में 30-40% और बड़े पैमाने पर सौर पीवी की तुलना में 25-30% सस्ता है । HLE तकनीक सल्फर डाइ ऑक्साइड, नाइट्रस ऑक्साइड, धूल कण

के उत्सर्जन में भी कमी लता है । यह तकनीक आज के दिन लगभग 2 गीगा टन ग्रीनहाउस गैस के उत्सर्जन में कमी ला सकता है। चूंकि नवीकरणीय ऊर्जा की पूंजी लागत ज्यादा और लोड फैक्टर कम होता है, HLE प्रौद्योगिकियां प्रति टन के आधार पर कार्बन डाइऑक्साइड को कम करने के लिए सबसे कम लागत प्रदान कर सकती हैं।

निष्कर्ष :

ऊर्जा संबंधित ग्रीन हाउस गैसों के उत्सर्जन में वृद्धि जारी रहेगी । उत्सर्जन को कम करने का कोई एक समाधान नहीं है - अक्षय ऊर्जा, दक्षता एवं भंडारण, कार्बन डाइ ऑक्साइड कैप्चर और स्टोरेज, हाइड्रोजन जैसी नवीन तकनीकों की आवश्यकता है । स्थायी ऊर्जा के लिए हमारी रणनीतियों से पता चलता है कि जलवायु परिवर्तन को संबोधित करने के लिए की गई ठोस कार्रवाई वैश्विक अभिगम और वायु गुणवत्ता के वैश्विक लक्ष्य को प्राप्त करने के लिए पूरी तरह से संगत है। चूंकि कोयला उत्पादन एवं उपयोग चुनौतीपूर्ण बना रहेगा अतः देश को आगे ले जाने के लिए सरकार को कोयला उद्योग के साथ सहयोगात्मक संबंध विकसित करने होंगे ।

डॉ. मनोज कुमार
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भारत कोकिंग कोल लिमिटेड, धनबाद।

सुलगता मन

आखिर कबतक
सहेगी धरती दर्द ....???
इन उन्मादों का !
कहीं खुल न जाये त्रिनेत्र उसके
और जल न जाये ये वन उपवन,,,
कहीं आ न जाये प्रलय
कहीं खो न जाए हरियाली
कहीं खो न जाओ मानव तुम इस पृथ्वी से!!
प्लास्टिक के थैले में
घुल रहें हैं वजूद उसके
ऐ मानव!
सुलग रहे हैं सारे कानून
धरती के सीने में!!
मौन है वह,,,
तुम्हारी विलुप्तता तक चुप है वो
चेत जाओ,,
वरना,,, धरती लोप हो जायेगी!
ऐ मानव!
"षडयंत्र रचा किसने,, धरा पर हुआ प्रकोप
वृक्ष जड़ से उखड़ रहें,,रहे हम नन्हें पौधे रोप
जल रहा जंगल सारा,, हरियाली हो रही लोप।।"

रिंकु दुबे "वैष्णवी"
हिन्दी विभाग,
कोयला भवन

CALANDRE DE L'ENVIRONMENT

Day	Event
22 Apr	Earth Day
28 Apr	World Day for Safety and Health at Work
22 May	International Day for Biological Diversity
31 May	Anti-Tobacco Day
03 Jun	World Bicycle Day
05 Jun	World Environment Day
08 Jun	World Ocean Day
15 Jun	Global Wind Day
17 Jun	World Day to Combat Desertification & Drought
11 Jul	World Population Day
26 Jul	International Mangrove Day
29 Jul	International Tiger Day
12 Aug	World Elephant Day
07 Sep	National Threatened Species Day
16 Sep	World Ozone Week
21 Sep	Zero Emission Day
22 Sep	World Car Free Day / World Rhino Day
28 Sep	Green Consumer Day
02 Oct	World Farm Animal's Day/ World Migratory Bird Day
03 Oct	World Habitat Day
04 Oct	World Animal Welfare Day
1-7 Oct	Wild Life Week
13 Oct	International Day for Natural Disaster Reduction.
24 Oct	World conservation Day
06 Nov	International Day for Preventing the Exploitation of the Environment in War and Armed Conflict
19 Nov	World Toilet Day
02 Dec	National Pollution Prevention Day / Bhopal Tragedy Day
05 Dec	World Soil Day
14 Dec	National Energy Conservation Day
29 Dec	International Day of Biological Diversity
02 Feb	World Wetland Day
03 Mar	World Wildlife Day (Green Consumer Day)
20 Mar	World Sparrow Day
21 Mar	World Forestry Day
22 Mar	World Day of Water
23 Mar	World Meteorological Day

BCCL IN NEWS

@BCCLEnvironment @bcclenvironment · Jun 5

WED 2021 with theme"Ecosytem restoration" was celebrated on 5th June at Panchvati Eco-Park in presence of CMD,BCCL ,along with him functional directors, HoD(env) and senior HQ, GMs were also present. During the occasion, Plantation was done at ground near Nehru Complex,koylaNagar

Bastacolla area_bccl @bccl_area · Jul 25

425 trees were planted at Dobari dump, today in collaboration with CISF Lodna & CISF Bastacolla. Native fruits & timber producing species including Gamhar, Teakwood (Sagwan), Gulmohur, Palash, Neem, Peepal, Guava, Amla etc. were planted on the occasion #greencoal #bastacollaarea

Coal India Limited @CoalIndiaHQ · May 4

Bharat Coking Coal Ltd. has commissioned a 350KWp grid connected roof top solar power plant with 280 KWp capacity at Central Hospital, Dhanbad & 70 KWp at its Hq. Koyla Bhawan, #Jharkhand. It has generated 60,000 units of energy reducing 24,000 Kgs of CO2 emission till April 2021

बीसीसीएल ने पीबी एरिया में 20 हेक्टेयर जमीन पर अर्जुन के पौधे लगाने का दिया है आदेश

नीचे खदान, ऊपर तसर के लिए अर्जुन के बगान

पहल

धनबाद | मुकेश सिंह

65 लाख की लागत से 23,320 पौधे लगाए जाएंगे

पर्यावरण संरक्षण के साथ-साथ स्वरोजगार के लिए बीसीसीएल ने महत्वाकांक्षी परियोजना का निर्णय लिया है। पीबी एरिया में भागाबांध कोलियरी के समीप स्थित 20 हेक्टेयर जमीन पर 64 लाख 91 हजार 249 रुपए की लागत से 33,320 अर्जुन पौधे लगाए जाएंगे।

योजना को लेकर वन विभाग को कार्यादेश दिया जा चुका है। खास बात यह है कि तैयार होने के बाद अर्जुन के पेड़ पर रेशम के कीट पाले जाएंगे, जिससे तसर मिलेगा। यानी उक्त योजना का लक्ष्य स्वरोजगार भी है। परियोजना प्रभावितों को तसर की खेती के लिए प्रेरित किया जाएगा।

मालूम हो शहतूत या अर्जुन जैसे पेड़ पर ही रेशम के कीट पलते हैं। इन पेड़ों के पत्ते बड़े चाव से रेशम के कीट खाते हैं और उनका बेहतर विकास भी होता है, जिससे काफी मात्रा तसर मिलता है। मामले में बीसीसीएल पर्यावरण विभाग के एचओडी ने बताया कि पिछले जून महीने में ही योजना बनी थी और वन विभाग को कार्यादेश दिया गया। बीच में परिस्थिति कुछ ऐसी हो गई कि योजना के क्रियान्वयन में विलंब हुआ। वन विभाग की ओर से योजना का क्रियान्वन होना है। डीएफओ के नाम कार्यादेश जारी किया गया है। करार के मुताबिक प्रति हेक्टेयर 1666 अर्जुन पौधे लगाए जाएंगे। दस साल तक वन विभाग पौधों की देखभाल करेगा और 80% स्वस्थ पौधों के साथ प्लांटेशन को पूर्ण करेगा। जिस जमीन का चयन किया गया है, वो उर्वर जमीन है। कंपनी के लीज होल्ड एरिया में है। पेड़ों की कटाई के बदले यह पौधरोपण कार्यक्रम है। मालूम हो कि खनन कंपनियां माइनिंग के लिए जितने पेड़ों की कटाई करती हैं, बदले में दस गुणा पेड़ लगाने का प्रावधान है। बताया गया कि पहले पेड़ों की कटाई के लिए कंपनियां वन विभाग को पैसे का भुगतान कर देती थीं। इसके बाद वन विभाग जमीन की उपलब्धता के अनुसार कहीं भी पौधरोपण करता था। अब बीसीसीएल ने अपने लीज होल्ड एरिया में पौधरोपण कराने का निर्णय लिया है।

Bharat Coking Coal Limited
@BCCLofficial

कोल इण्डिया लिमिटेड के अध्यक्ष श्री प्रमोद अग्रवाल बीसीसीएल के समीक्षात्मक दौरे पर धनबाद आगमन पर बीसीसीएल के अध्यक्ष-सह-प्रबंधक निदेशक श्री पी एम प्रसाद की अगुवाई में सभी उच्च अधिकारियों द्वारा गरम जोशी के साथ स्वागत किया गया।

Translate Tweet

Bharat Coking Coal Limited @BCCLofficial · Sep 20

An Agreement signing ceremony was organized on 20.09.2021 between BCCL and PEPL for Coal Bed Methane Jharia Block-I at Level-3, Conference Hall, Koyla Bhawan. @CoalMinistry @JoshiPralhad @PralhadJoshiOfc @raosahebdanve @PIB_India @CoalIndiaHQ

Bastacolla area_bccl @bccl_area · Jul 12

A nursery has been developed at Old GM Bungalow, Rocp; Bastacolla area. Old tyres have been used in fencing & empty sanitizer jars have been repurposed as seedling trays for the seedlings.
Seedlings of local trees & fruit bearing plants have been propagated in the nursery.

पर्यावरण विभाग

भारत कोकिंग कोल लिमिटेड

एक मिनी रत्न कम्पनी

(कोल इंडिया लिमिटेड का एक अंग)

कोयला भवन, धनबाद-826005

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