Status of R&D Projects undertaken under the R&D scheme with financial assistance from Ministry of Steel (Government Fund):

(in Rs. lakhs)

Sl. No	R&D Projects	R&D Agency	Sanctioned Government Funding	Start Date/ Completion Date	Name of Project Investigator	Status of Project
1	Improvement in sinter productivity through deep beneficiation and agglomeration technologies for rational utilization of low grade iron ores and fines	CSIR-NML	**1,255.80**	• Start Date: April 2010 • Completion Date: June 2014	Dr. Ratnakar Singh, Email: rs@nmlindia.org	• **Project Completed.** • Detailed bench scale & pilot scale studies were undertaken for development of process route for beneficiation of the three iron ore samples. • Micro-pelletization studies on fine grained iron ore concentrate and Sintering studies were carried out using micro-pellets as the partial feed under varied conditions. • Use of (50%) the micro-pellets/pre-balled concentrate alongwith 50% sinter fines led to marked improvement in sinter productivity due to improved bed permeability. • Techno-economic feasibility studies of the processes developed have been carried out in association with MECON.
2	Development of Alternate complementary Route of Iron/Steel making with reference to Indian raw material viz low grade iron ore and non coking coal	CSIR-NML	**858.00**	• Start Date: April 2010 • Completion Date: December 2013	Dr. Avimanyu Das, Email: adas@nmlindia.org	• **Project completed.** • Coal samples were procured from various sources and flow sheets developed to obtain clean coal with ~12% ash for each one of them. • Clean coal and iron ore concentrate used to produce composite micro-pellets. • Micro pellets were reduced in coke oven with excess carbon to form ferro-carbon. Excellent metallization was achieved under optimum conditions. and sufficient quantity of ferro-carbon was produced in the pilot oven for further melting studies. • Smelting studies carried out with the generated ferro-carbon in the SAF for steel making. Although good metallization has been achieved in the Ferro Carbon (around 90%), the steel produced have around 1.5% C and 0.1% P which are not desirable. • Findings not encouraging for implementation.

3	Production of low Phosphorus Steel using DRI through Induction furnace route adopting innovative fluxes and/or design (refractory) changes.	CSIR-NML	**237.00**	• Start Date: April 2010 • Completion Date: Nov 2012	Shri R. K. Minj, Email: rkm@nmlindia.org	• **Project completed.** • Process has been developed in laboratory scale for production of low Phosphorus steel in laboratory scale Induction Furnace using DRI. • Industrial Scale Trials taken up in 2nd Phase (Project Sl.No.10).
4	Smelting reduction of iron ore/fines by hydrogen plasma and elimination of CO2 emission	CSIT-IMMT	**990.35**	• Start Date: April 2010 • Completion Date: July 2015	Dr.B.Bhoi, Email: bbhoi@immt.res.in	• **Project Completed.** • Very futuristic technology demonstration project. • Feasibility of smelting reduction of iron ore/fines using hydrogen plasma has been explored in laboratory/ pilot scale for which a patent has also been filed in the US
5	Beneficiation of Iron Ore slimes from Barsua Mine	RDCIS, SAIL	**1,408.20**	• Start Date: Jan 2012 • Scheduled Completion Date: March 2017	Dr S K Pan, Email: skpan@sail-rdcis.com	• **Project not pursued** beyond the lab scale studies. • Pilot plant could not be setup pending statutory clearances at mine site.
6	Development of pilot scale pelletization technology for Indian Goethitic/hematite ore with varying degree of fineness	RDCIS, SAIL	**2,206.27**	• Start Date: Jan 2012 • Scheduled Completion Date: March 2018	Dr S K Pan, Email: skpan@sail-rdcis.com	• **Project Completed.** • Pilot Scale pelletisation plant setup. • The automated Pellet Heat Hardening System has been commissioned and trials successfully carried out using the system. • It was demonstrated by suitably changing the variable parameters, all types of low grade ores with high LOI content can be agglomerated to pellet form for further use in steel industry. • Pilot scale facilities created at RDCIS and IMMT can be utilized by scientists/technologists all over the country for further development of pelletisation technology.

7	CO2 abatement in Iron and Steel production by process optimization	IIT Kharagpur	**84.36**	• Start Date: Jan 2011 • Completion Date: September 2014	Prof. P. K. Sen, Email: pksen@metal.iitkgp.ernet.in	• **Project completed.** • Based on the predictions of the developed mathematical models the following optimization results has been obtained with Input conditions of moisture content 35-64 gms/Nm3, blast temperature 903-1018 C, sinter/ore ratio of 2.07-2.75 and validated during BF#3 Trials at RSP: • Increase of Productivity by about 10 - 12 % based on observed productivity 1.6-1.7 T/day/M3 of W.V • Decrease of CO2 in the exit gas by about 8 -10% • Decrease of Carbon rate by about 8 – 10 % based on observed C rate of around 500 kg/THM
8	Production of low ash (10% ash) coal (coking non coking) from high ash Indian coals including desulphurisation of high sulphur North East coal	CSIT-IMMT	**1,688.53**	• Start Date: Jan 2011 • Completion Date: June 2014	Dr. S. K. Biswal skbiswal@immt.res.in	• **Project completed.** • It has been established at laboratory scale that it is possible to beneficiate ROM coal with less than 30% ash to achieve 10% ash with appreciable yield. • Multiple flow sheets for beneficiation were developed for different grades of coking & non coking coals which can be used by the user industry.
9	Development of the technology for production of CRGO Steel Sheets and other value added Steel Products (DPR)	CSIR-NML	**34.46**	• Placement of Order for the DPR: May 2015 • Submission & Approval of DPR: Sept 2016	Dr Amitava Mitra amitra@nmlindia.org	• DPR of the project prepared by MECON and approved by Stakeholders. • CSIR did not pursue the project further.
10	Production of low Phosphorus steel through Induction Furnace route using DRI as major ferruginous raw material – An Industrial Assessment	CSIR-NML	**193.00**	• Start Date: August 2014 • Completion Date: March 2016	Shri R. K. Minj, Email: rkm@nmlindia.org	• **Project Completed.** • Lime based flux was indigenously developed. Trial heats in 1-10 ton capacity induction furnaces resulted in reduction of P level from 0.075-0.09 to 0.06% max. • Lime based composite pellets were tried in industrial heats of 1-8 ton capacity. Dephosphorisation to the extent of 15% max could be achieved. • Basic engineering package prepared.

11	Development of Cost Effective Refractory Lining Materials for Induction Melting Furnace suitable for production of Quality Steel	CSIR-CGCRI	**165.00**	• Start Date: April 2016 • Completion Date: March 2018	Dr. H. S. Tripathi hstripathi@cgcri.res.in	• **Project Completed.** • Magnesia based refractory mass was developed and series of laboratory scale induction furnace trials were conducted to evaluate the performance of the ramming mass during refining of steel. • In all the trials 80% DR was used in the charge mix to replicate the industrial practice. A dephosphorisation flux earlier developed in one of the completed R&D project was used. • The results showed a reduction of phosphorus level from 0.06-0.10% in the input charge to below 0.05% in the final steel. • The lining life was found to be higher (13-16 heats) than the target lining life of 8-10 heats in 20Kg induction furnace trials. The maximum lining life achieved was 19 heats.
12	Development of Infrared Camera Based Torpedo Ladle Car Condition Monitoring System	MECON	**154.00**	• Start Date: August 2016 • Completion Date: July 2018	Dr. B.Chakraborty bchakraborty@meconlimited.co.in	• **Project Completed.** • An infrared camera based torpedo car condition monitoring system was successfully commissioned in SMS-II of RSP. • The system is capable to monitor continuously the condition of the torpedo ladle, detect hot spots, sound an alarm and prevent breakouts during a torpedo's campaign life.
13	Production of low Carbon & low Phosphorus Ferromanganese by metallothermic treatment of high Manganese Slag using Silicomanganese	CSIR-NML	**150.00**	• Start Date: Jan 2017 • Completion Date: Dec 2018	Shri R. K. Minj, Email: rkm@nmlindia.org	• **Project Completed.** • Low Carbon & low Phosphorus Ferromanganese successfully produced in lab scale by metallothermic treatment of high Manganese Slag using Silicomanganese.

14	Production of highly metallised Directly Reduced Iron from mill scale & lean grade coal in Tunnel Kiln	CSIR-NML	**151.00**	• Start Date: Dec 2016 • Completion Date: March 2018	Dr. Dayanand Paswan dnpaswan@nmlindia.org	• **Project Completed.** • Technology has been developed for the production of highly metalized DRI from iron ore, mill scale and lean grade coal in tunnel kiln. • Commercial scale trials were successfully conducted to demonstrate the technology at M/s SMRW and 100 tons of DRI was produced in a continuous manner • Technology has been transferred to M/s SMRW, Ranchi for commercial production of DRI through tunnel kiln.
15	Development of Automation System for Optimum Coal Blending at Coal Handling Plant of Coke Oven Batteries	RDCIS, SAIL, Ranchi	**645.00**	• Start Date: June 2015 • Scheduled Completion Date: **May 2018**	S Mitra +91-8986880347 smitra@sail-rdcis.com	• Around 97% progress in the project. The following activities carried out: • Control system architecture & design for the automated system carried out, Technical Specification finalized for Weigh Feeders, PLC, Elemental Analyzers and other accessories and procurement done • Weigh feeders for 47 nos. Silos Upgraded for seamless operation and control of Integrated System • PLC System Up-graded and Software developed for integration of aforesaid 47 weigh feeders and are under regular operation at Coal Handling Plant of Bokaro Steel Plant • Elemental and Moisture Analyzer for Incoming & Outgoing Coal installed and commissioned at CHP, BSL • Preliminary Acceptance Test Completed for both the incoming & blend coal elemental analyzers • Level-II software implemented and being validated • Final Acceptance Test of Elemental Analyzers as per contract, Validation of L-II software and Submission of Project Completion Report are to be done • The PI requested for extension of the project till June 2019 to complete the balance work
16	Economic production of iron through direct reduction of Mill Scale by low grade coal of	MNIT, Jaipur	**166.00**	• Start Date: October 2015	M K Banerjee 9660005498 mkbanerjee@hotmail.co	• Around 98% progress in the project. The following activities carried out:

	Rajasthan			• Scheduled Completion Date: **Sept 2018**	m, patnaik.amar@gmail.com	• The proposed equipment, RDI apparatus, the laser particle size analyzer, and vacuum induction furnace been installed successfully in MNIT. • Solid Gas Reactor is designed and fabricated by the vendor is completed and installed at MNIT. Trial experiments are successful. Optimization has been done • The reduction in solid gas reactor shows a maximum of 96.75% of metallization in the materials at 1100 oC at 240 min time. • The PI requested for extension of the project by 6 months (till December 2019) so that further trials are conducted to fine tune the technology, cost analysis done, patent filing, to explore technology transfer to the industrial partner, report preparation etc.
17	Develop Procedure for Joining Next Generation High Temperature Material to be used for Supercritical/ Ultra Supercritical Power Plant by Friction Stir Welding	Jadavpur University, Kolkata	**558.26**	• Start Date: October 2015 • Scheduled Completion Date: Sept 2018	Dipankar (Sanyal) Jadavpur University 9831483461, dipans26@gmail.com	• Around 30% progress in the project. The following activities carried out: • Procurement completed for High temperature furnace for Tensile Testing Machine, P91 seamless pipes to be welded, Ten M44141 PCBN coated FSW tools, Procurement of input card for FSW machine, UPS carried out • Repairing Y-axis travel, E-stop button and MMI PC of the existing FSW machine carried out. • Installing programmable rotary turntable fixture for welding pipes of ID between 255mm and 260mm completed • Few welding trails were conducted. Poor circularity of the pipes resulted in offset between the joined pipes. Welding 6mm thick P91 pipes by partial engagement of pin of the tool. Pipe thickness of around 7mm may provide welding with complete tool penetration. New set of tools are not compatible for insertion of existing thermocouple wires. • To initiate process of procuring appropriate P91 pipes and some tools compatible with existing thermocouple • Expected to be completed in 2020-21 (**September 2020**)

18	Development of Dry Slag Granulation Technology and Energy Recovery System for Blast Furnace Slag for Producing Clinker Compatible Product	IIT Madras, Chennai	**84.37**	• Start Date: April 2016 • Scheduled Completion Date: March 2020	S Pushpavanam spush@IITM.AC.IN Mobile: 9445104479	• Around 75% of the work is completed • Determined optimum parameters for dry slag granulation. • Carried out heat transfer experiments in packed bed and fluidised bed reactors. • Analysed mixtures of slag and lime under different conditions of heating and cooling and studied the different phases. • Performed experiments in NML Jamshedpur with blast furnace slag to determined how to obtain white cement by adding lime at 100 kg of capacity of slag.
19	Development of nickel free nitrogen austenitic stainless steel for biomedical applications	IIT BHU, Varanasi	**284.45**	• Start Date: Jan 2017 • Scheduled Completion Date: Dec 2019	G S Mahobia Mobile : 9889296522 gsm.met@iitbhu.ac.in	• Around 60% progress in the project. The following activities carried out: • Preparation of corrosion – fatigue laboratory and procurement & installation of Corrosion Fatigue Test System completed • Cell proliferation and electrochemical corrosion behaviour study on Ni-free grade and 316L SS from Jindal Stainless • Modified High Nitrogen steel proposed and trial heats undertaken at MIDHAI • The Lab/ Pilot scale studies & findings have shown that the proposed material showed acceptable biocompatibility, improved corrosion resistance and fatigue strength. • Future plan: Study on the effect of USP treatment on High Cycle Fatigue (HCF) life of proposed steel. Paper/patent publication. Few implants will be prepared at M/s GESCO India - Chennai
20	Indigenous Development of Model based Breakout Prediction System (BOPS) for Continuous Casters	RDCIS, Ranchi	**260.00**	• Start Date: Jan 2017 • Scheduled Completion Date: Dec 2019.	I Banerjee Mobile : 8986880021 indranil@sail-rdcis.com	• Around 25% progress in the project. The following activities carried out: • Model development collaborating agency identified as CDAC (In association with IIT Madras) & MoA signed • System design completed, Technical specification of mould instrumentation and automation items finalised and order placed. • Mould instrumentation items which consists of thermocouples, special

						through bolts, multi-pin connectors, special junction boxes and other accessories have not been supplied till date and Vendor has been non-responsive • Risk purchase action has been initiated against the party to get the job done by alternate vendor. • The balance work to be done are Placement of order Mould instrumentation items and receipt of items, erection & and commissioning of mould instrumentation and data acquisition system, Off-line development of BOPS model by CDAC, On-line implementation of the model and fine tuning thereafter • The PI requested for extension of the project by one year till December 2020 to complete the balance work
21	Development of Fluidised Bed Reduction Roasting Process for slimes & low grade iron ores by utilizing thermal grade coal for their magnetic susceptibility properties and maximizing the iron recovery	IIT Madras, Chennai & JSW Steel	**122.76**	• Start Date: Dec 2016 • Scheduled Completion Date: Nov 2020	Sabita Sarkar Mobile: 9445737724 sabita.sarkar@iitm.ac.in	• Around 46% progress in the project. The following activities carried out: • The experimental cold model set-up has been commissioned and tested for fluidization. Development of mathematical models and its's validation with cold model experiments conducted • Reduction of iron ore sample was done in a fluidized bed reactor using reducing gas in National Metallurgical Laboratory (NML), Jamshedpur. Experimental results show good conversion from hematite to magnetite. • Balance work is to Optimize the process parameters by IITM, development of reactor system parameters & setting up of pilot scale facility and Technology demonstration at JSW works
22	Reduction Roasting and Microwave Heating of some difficult to treat Ores for the production of Pellet Feed Concentrate	CSIR-IMMT Bhubaneswar	**124.80**	• Start Date: Dec 2016 • Scheduled Completion Date: Nov 2019	Swagat S. Rath Cell No.+91-7873411250 ssrath@immt.res.in	• The PI informed that around 75% progress in the project. The following activities carried out: • Reduction roasting-magnetic separation studies of different low-grade ores using **Conventional** and **Microwave** route • Microwave assisted reduction roasting takes less time compared to conventional

						one. Appreciable Fe grade and recovery obtainable from ores that do no respond to conventional beneficiation processes. Low-grade ores containing magnetite more responsive to microwave treatment. • MW assisted reduction roasting-magnetic separation studies were carried out for a BHQ ore with 39% Fe. The ore could be upgraded to 63-64% Fe with a Fe recovery of 60% at MW power of 5kW, a coal to ore ratio of 0.15 and 20 min roasting time. With charcoal (4%) as an additive, the Fe recovery was 70% • The PI requested for extension of the project by six months for validation of microwave reduction roasting, MW reduction for more low-grade iron ores, and comparison of conventional and MW reduction roasting
23	Modeling & Optimization of High Concentration Iron Ore fines /concentrate slurry Pipelines for Indian Iron Ore Processing Industries	CSIR-IMMT Bhubaneswar & NMDC Ltd.	**212.50**	• Start Date: Jan 2017 • Scheduled Completion Date: Dec 2019	P K Senapati Mobile: 9437002838 pksenapati@immt.res.in	• Around 75% progress in the project. The following activities carried out: • A comparative evaluation of Rheological characteristics of four different Iron ore samples (NMDC, ESSAR, KIOCL & MEL) has been carried out with the manipulation of pH (through lime dosing) & particle size distribution at a slurry concentration of 70% by weight. • The modification/installation of 50 and 100 mm NB pipelines along with installation & commissioning of high concentration Piston Diaphragm slurry pump has been completed. • Pilot plant studies in 50 mm & NB pipe test loop was carried out. • Mixing studies for preparation of high concentration Iron ore concentrate slurry with a 120 L capacity mixing set up has been carried out & qualitative analysis of power consumption & re-suspension time for preparation of concentrated iron ore slurry (60-78% by weight) were carried out. • Bottlenecks: The tendering process for installation of slurry pilot plant having 150mm & 200mm NB pipe sizes (200m

						long each) were carried out twice but could not materialize in both the cases. Third time tendering to be done. • Need extension of 6 months in the project.
24	Development of a cost effective green technology for Pre Reduction of Chromite Ore in Tunnel Kiln and Production of High Carbon Ferro Chrome in SAF	NISST, NML & MECPL	**306.50**	• Start Date: October 2017 • Scheduled Completion Date: September 2019	Shri. Rajib Paul, Director NISST, 9560004102, director@nisst.org	• Around 65% progress in the project. The following activities carried out: • 10 Nos. reduction trials of chromite ore pellets in mullite saggar in muffle furnace at 1500oC has been undertaken at M/s MECPL Rairangpur. • 32 Nos. reduction trials of chromite ore pellets has been done using graphite crucible with reduction done in gas fired furnace or in induction heating has been carried out at CSIR-NML Jamshedpur. • Melting trial has been carried out in 20 Kg induction furnace. • During the trails it was found that SAF may not be necessary as the product can be obtained in Tunnel Kiln itself • Work is under process for the renovation of tunnel kiln and installation of mixer machine at M/s MECPL, Rairangpur for conducting pilot studies. • Renovation work of 500kVA SAF for pilot studies is under progress. • Work is slightly behind schedule six month extension is requested
25	A Novel Approach of Making Green Belite Cement from Electric Arc Furnace Steel Making Slag	IIT Kharagpur	**139.20**	• Start Date: October 2017 • Scheduled Completion Date: September 2020	Dr. Koushik Biswas, IIT Kharagpur k_biswas@metal.iitkgp.ac.in Mobile: 9433473932	• Around 55% progress in the project. The following activities carried out: • Lab/ Pilot scale studies has been successful in bringing out the cementitious properties of EAF slag • Able to achieve strength of 10.4 MPa (more than type S morter (5 MPa)) with much lower clinkering temperature (1350ºC) • Bottleneck faced in delivery and installation of the equipments
26	Amorphous Electrical Steel (AES) for Energy Application submitted by NML Jamshedpur	CSIR-NML Jamshedpur	**3634.00**	• Start Date: Nov 2017 • Scheduled Completion Date: Oct 2021	Dr Amitava Mitra, NML, amitra@nmlindia.org, Tel.No.:+91 657 2345205/ 2345220	• Around 10% progress in the project. The following activities carried out: • **R&D on new alloy development & Process Modelling:** Development of newer materials and laboratory scale

						experimentation on amorphous electrical steel alloy compositions, their ribbon preparation and property evaluation. Process modelling is in progress • **Procurement of Plant/ Equipment:** Finalisation of the concept design of the Pilot Plant detailing of the critical components of the melt, spinning equipment done. Expression of interest towards development of Amorphous electrical steel pilot plant advertised on December 06, 2017. Notice Inviting Tender (NIT) was floated in December 24, 2018. Only one Bid received from M/s Therelek Engineers Pvt. Ltd. Bid was found technically suitable. However, Independent External Monitor (IEM) appointed by CSIR observed some administrative discrepancies. • **Site development and building of shed for Plant:** The site identified at the Large Scale Testing Facility Area of CSIR-NML, Soil load bearing test carried out, Work in progress for renovation of existing building to accommodate utilities and setting up characterisation facilities for amorphous electrical steel.
27	Development of Design Guidelines and Specifications for utilization of steel slag in road construction	CRRI	**286.50**	• Start Date: October 2018 • Scheduled Completion Date: September 2021	Shri Satish Pandey, CRRI M: +91 9999 366937 satishpandey.crri@nic.in	• Project on Schedule. Around 15-20% progress in the project. Following activities carried out: • Literature survey carried out on type of steel slag available in integrated steel plants, likely environmental impacts, potent use of steel slag as road making aggregate across the globe. • Comparative evaluation of steel slag aging and processing methodology. • Laboratory evaluation of processed LD slag by Tata Steel has been completed. • Development of guidelines for steel slag utilization in Rural Road: IRC:SP:121-2018: “Guidelines for Use of Iron, Steel and Copper Slag in Construction of Rural Roads”. • Procurement of various laboratory and field study equipments Identification of

						test section for field trial with Industrial partner and NHAI officials. • Development of Steel Slag Characterization lab
28	Development of super alloy grade 625 & 825 for commercial market	MIDHANI	**800.00**	• Start Date: September 2018 • Scheduled Completion Date: September 2021	Dr Lekhi, CMD, MIDHANI nishank.jain@midhani.com, 040-24184494 cmd@midhani-india.in snprasad@midhani-india.in	• Project on Schedule. Around 25% progress in the project. Following activities carried out: • Pilot trials: Melted Superalloy in 5 t Vacuum Induction Refining Furnace – 3 melts & 20 t EAF+LF+VOD – 2 melts. The primary ingots were remelted either in ESR or VAR and forged to various sizes as per requirement. • Control of oxidizable elements (niobium, boron, etc) in a narrow range difficult. Higher oxygen and nitrogen in the alloy than that is acceptable. Oxygen and nitrogen forms inclusions and other brittle phases that lead to cracking during hot working resulting in lower yield. A lower vacuum of less than 10-3 mbar desired. • Based on the feedback modified the process • Old VIM 2.5 t under revamping. Expected outgo – 2.69 Cr. • Site clearance for new VIM – 8 t completed. • New VIM – 8 t: Technical specification prepared. Tendering initiated.
29	Optimisation of floatation process for Indian Coking Coal using advanced Pneuflot Floatation Cell by IMMT	IMMT	**91.54**	• Start Date: October 2018 • Scheduled Completion Date: March 2020	Dr R K Dwari, IMMT, Mobile: 9437194521, Email: rkdwari@immt.res.in	• Project on Schedule. Around 30% progress in the project. The following activities carried out: • Detail physical, chemical and petrography studies on low-grade coking coal (Dugda washery feed coal) is completed. • Flotation studies on the Dugda coal using Denver floatation cell is completed. Release analysis on Dugda coal is completed. Effect of pH, collector, frother, depressant on the flotation of Dugda coal is completed. Optimization of -0.5 mm size fraction is completed using response surface methodology. • Pneuflot flotation cell (Make: MBE Germany) has been indented. Purchase order to be placed with delivery time of 4

						months. Expected installation: Last week of Sept. 2019
30	Fundamental process engineering to minimize re-oxidation of steel during teeming via a ladle shroud leading to improved castability and cleanliness	IIT, Kanpur	**154.63**	• Start Date: September 2018 • Scheduled Completion Date: September 2021	Prof Dipak Mazumdar, IIT Kanpur, Tel:91-512-2597640;91-512-2597328, dipak@iitk.ac.in	• Project on Schedule. Around 30% progress in the project. The following activities carried out: • Data collection from Industry completed. • Fabrication of working, full scale, PERSPEX shroud system with tundish sections have been completed • Procurement of all other principal equipment is in progress • Leading steel industries such as JSW Steel Limited, Vardhman Steel, Hospet Steels and Hi-Tech refractories are being approached for collaboration.
31	Conversion of emitted CO2 to chemical fuels.	IMMT, Bhubaneswar	**77.05**	• Start Date: October 2018 • Scheduled Completion Date: Oct 2021	Prof. Suddhasatwa Basu, Director, IMMT, Tel: +91 (0674) 2567126; 2379400; E-mail: dir@immt.res.in, sbasu@immt.res.in	• Around 10% progress in the project. • Literature survey completed and approach finalised • Orders for lab equipment placed.
32	Development of newer Cementitious Materials using Chemically Activated LD Slag.	CBRI, Roorkee	**195.00**	• Start Date: October 2018 • Scheduled Completion Date: Oct 2021	Dr S. K. Singh, CBRI, 9412074787(Mob) sksingh_cbri@yahoo.co.in	• Project on Schedule. Around 15% progress in the project. The following activities carried out: • Procurement of LD slag and other raw materials, • Setting up of Cement Research Lab • Characterisation of slag followed by trail scale mechanical and alkali activation have been performed on the LD slag to achieve the first objective viz. To develop a process technology for utilisation of high volume LD slag for making cementitious binders / blended cement
33	Integrated cost effective technology for attaining Zero liquid discharge in steel plants with emphasis on slag utilization	CIMFR	**23.24**	• Start Date: October 2018 • Scheduled Completion Date: Oct 2020	Prof Pallabi Das, pallabidas@cimfr.nic.in, Tel: 9654979245	• Project on Schedule. Around 32% progress in the project. The following activities carried out: • Identification of different wastewater matrix that can be removed by slag: Experiments are ongoing • Technology development to attain zero liquid discharge: a) wastewater characterization is in progress, b) Stage-wise remediation studies are being

						undertaken • Possibility of value added product recovery : a) ammonia recovery b) extraction of silicate from steel slag: Experimentations are ongoing • Procurement of lab equipment in progress
34	Synthesis of Kudremukh Iron Ore Mine Tailings based Geopolymer Aggregate using Fly Ash as Precursor in Construction Industry	KIOCL & DCE, Bangalore	**11.20260**	• Start Date: December 2018 • Scheduled Completion Date: Dec 2019	K V Bhaskara Reddy, GM (Mining & Exploration) Mob: 9611127688 bnbd@kioclltd.com Dr.H.K.Ramaraju Professor & Head DCE, Mob: 8026662226, hkramaraju@gmail.com ashasavi@gmail.com	• Around 10% progress in the project. The following activities carried out: • Fly ash & Iron ore tailings samples collected and preliminary investigations carried out. The physical and chemical properties of iron ore tailings are conducive for future studies. • Researcher submitted to the committee that there is restriction imposed by the forest department on human activity in the proposed mine area (Lakya dam) and the same is affecting the project significantly.
35	Waste Management of Generated Sludge from Indian Steel and Steel Related Plants: A Sustainable Business Model	BITS-Pilani, Hyderabad Campus	**38.05**	• Start Date: November 2018 • Scheduled Completion Date: Oct 2021	Prof. Srikanta Routroy, BITs Pilani, srikanta@pilani.bits-pilani.ac.in, Mobile: 09694096456	• Around 5% progress in the project. The following activities carried out: • Pickling sludge samples had been collected from common effluent treatment plants situated at Bhiwadi. • Electroplating sludge sample had been collected from Jaquar & Company Private Limited., Bhiwadi. • Physico-chemical analysis of the collected sludge is in progress. • Procurement of hydraulic brick making machine is in final stage.
36	Integrated nanotechnology for coke oven effluent treatment	DSP, SIAL and Eesavyasa Technologies	**199.82**	• Approval Year: 2018-19		• The project has not been pursued by the R&D Agencies