

1 **Life Cycle Assessment of Chitosan modified Ni-Fe Layered Double Hydroxide for**  
2 **adsorptive removal of Arsenic(III) from water: Comparison on the impacts of**  
3 **adsorbent recycling, instrument use and source of energy**

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17 **Table S1: Category wise impacts associated with the use of magnetic stirrer for As(III)**  
 18 **removal by Ni-Fe LDH/Ch**

Name	Category	Impact result	Unit
<b>human toxicity: non-carcinogenic - human toxicity potential (HTPnc)</b>		<b>102.85</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	58.88	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	32.76	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.32	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.71	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.44	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.38	kg 1,4-DCB-Eq
<b>ecotoxicity: terrestrial - terrestrial ecotoxicity potential (TETP)</b>		<b>113.22</b>	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	30.14	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	27.34	kg 1,4-DCB-Eq

nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	13.88	kg 1,4-DCB-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	13.65	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.15	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	12.15	kg 1,4-DCB-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.67	kg 1,4-DCB-Eq
<b>material resources: metals/minerals - surplus ore potential (SOP)</b>		<b>2.68</b>	<b>kg Cu-Eq</b>
ionising radiation - ionising radiation potential (IRP)		0.8	kBq Co-60-Eq
photochemical oxidant formation: human health - photochemical oxidant formation potential: humans (HOFP)		0.12	kg NOx-Eq
water use - water consumption potential (WCP)		0.62	m3
<b>ecotoxicity: freshwater - freshwater ecotoxicity potential (FETP)</b>		<b>6.54</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	5.23	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.88	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous,	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers	0.18	kg 1,4-DCB-Eq

liquid   Consequential, S - UN-SEASIA	and nitrogen compounds		
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.084165	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.076527	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.069941	kg 1,4-DCB-Eq
<b>human toxicity: carcinogenic - human toxicity potential (HTPc)</b>		<b>2.53</b>	<b>kg 1,4-DCB-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.57	kg 1,4-DCB-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.59	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.098174	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.095028	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.086393	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.078903	kg 1,4-DCB-Eq
photochemical oxidant formation: terrestrial ecosystems - photochemical oxidant formation potential: ecosystems (EOPF)		0.13	kg NOx-

			Eq
<b>eutrophication: marine - marine eutrophication potential (MEP)</b>		<b>0.002737</b>	<b>kg N-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.001459	kg N-Eq
market for wastewater, average   wastewater, average   Consequential, S - RoW	370:Sewerage / 3700:Sewerage	0.000562	kg N-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000306	kg N-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000206	kg N-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000174	kg N-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.000111	kg N-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-1E-04	kg N-Eq
<b>energy resources: non-renewable, fossil - fossil fuel potential (FFP)</b>		<b>16.73</b>	<b>kg oil-Eq</b>
<b>ecotoxicity: marine - marine ecotoxicity potential (METP)</b>		<b>8.36</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	6.59	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.19	kg 1,4-DCB-Eq

- IN-Northern grid			
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.24	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.12	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.11	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.097266	kg 1,4-DCB-Eq
<b>ozone depletion - ozone depletion potential (ODP<sub>infinite</sub>)</b>		0.000124	<b>kg CFC-11-Eq</b>
<b>particulate matter formation - particulate matter formation potential (PMFP)</b>		0.11	<b>kg PM2.5-Eq</b>
acidification: terrestrial - terrestrial acidification potential (TAP)		0.25	kg SO2-Eq
<b>eutrophication: freshwater - freshwater eutrophication potential (FEP)</b>		<b>0.033779</b>	<b>kg P-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.023223	kg P-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.006358	kg P-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00124	kg P-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S -	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001015	kg P-Eq

RoW			
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001004	kg P-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000594	kg P-Eq
<b>climate change - global warming potential (GWP100)</b>		<b>61.23</b>	<b>kg CO2-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	30.47	kg CO2-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.68	kg CO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	5.24	kg CO2-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	4.99	kg CO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.84	kg CO2-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.25	kg CO2-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.65	kg CO2-Eq

20 **Table S2: Category wise impacts associated with the use of ultrasonicator for As(III)**  
 21 **removal by Ni-Fe LDH/Ch**

Name	Category	Inventor y result	Unit	Impact t factor	Unit	Impact result	Unit
<b>acidification: terrestrial - terrestrial acidification potential (TAP)</b>						<b>0.25</b>	<b>kg SO2- Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.006346	kg SO2- Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution					0.096038	kg SO2- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals					0.007444	kg SO2- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.014321	kg SO2- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals					0.11	kg SO2- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.012731	kg SO2- Eq
<b>climate change - global warming potential (GWP100)</b>						<b>62.58</b>	<b>kg CO2- Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals					0.65	kg CO2- Eq



Consequential, S - RER			
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.68	kg CO2-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	31.81	kg CO2-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.25	kg CO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	5.24	kg CO2-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	4.99	kg CO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.84	kg CO2-Eq
<b>ecotoxicity: freshwater - freshwater ecotoxicity potential (FETP)</b>		<b>6.58</b>	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.18	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.92	kg 1,4-DCB-Eq

market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	5.23	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.069941	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.076527	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.084165	kg 1,4-DCB-Eq
<b>ecotoxicity: marine - marine ecotoxicity potential (METP)</b>		8.41	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.24	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.24	kg 1,4-DCB-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	6.59	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.097266	kg 1,4-DCB-Eq
nitric oxide production	201:Manufacture of basic chemicals, fertilizers	0.11	kg 1,4-

nitric oxide   Consequential, S - GLO	and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals		DCB- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.12	kg 1,4- DCB- Eq
<b>ecotoxicity: terrestrial - terrestrial ecotoxicity potential (TETP)</b>		114.43	<b>kg 1,4- DCB- Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.67	kg 1,4- DCB- Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	30.14	kg 1,4- DCB- Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN- Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	28.55	kg 1,4- DCB- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	13.65	kg 1,4- DCB- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	12.15	kg 1,4- DCB- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	13.88	kg 1,4- DCB- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.15	kg 1,4- DCB- Eq

<b>energy resources: non-renewable, fossil - fossil fuel potential (FFP)</b>		17.09	<b>kg oil-Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.35	kg oil-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	4.63	kg oil-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	8.49	kg oil-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.52	kg oil-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.65	kg oil-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	1.42	kg oil-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	1	kg oil-Eq
<b>eutrophication: freshwater - freshwater eutrophication potential (FEP)</b>		<b>0.03480</b>	<b>kg P-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000594	kg P-Eq

market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.02425	kg P-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.006358	kg P-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001015	kg P-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00124	kg P-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001004	kg P-Eq
<b>eutrophication: marine - marine eutrophication potential (MEP)</b>		<b>0.002802</b>	<b>kg N-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000206	kg N-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.001524	kg N-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-1E-04	kg N-Eq
market for wastewater, average   wastewater, average	370:Sewerage / 3700:Sewerage	0.00056	kg N-Eq

Consequential, S - RoW			
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00017 4	kg N- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00011 1	kg N- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00030 6	kg N- Eq
<b>human toxicity: carcinogenic - human toxicity potential (HTPc)</b>		<b>2.6</b>	<b>kg 1,4- DCB- Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.08639 3	kg 1,4- DCB- Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.64	kg 1,4- DCB- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.59	kg 1,4- DCB- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.07890 3	kg 1,4- DCB- Eq
nitric oxide production   nitric oxide   Consequential, S -	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.09502 8	kg 1,4- DCB- Eq

GLO			
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.098174	kg 1,4-DCB-Eq
<b>human toxicity: non-carcinogenic - human toxicity potential (HTPnc)</b>		<b>104.3</b>	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.32	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	34.21	kg 1,4-DCB-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	58.88	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.38	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.71	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.44	kg 1,4-DCB-Eq
<b>ionising radiation - ionising radiation potential (IRP)</b>		<b>0.85</b>	<b>kBq Co-60-Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.059871	kBq Co-60-Eq

Consequential, S - RER			
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.02617	kBq Co-60-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.11	kBq Co-60-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-0.00905	kBq Co-60-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	-0.18	kBq Co-60-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	-0.15	kBq Co-60-Eq
<b>land use - agricultural land occupation (LOP)</b>		1.3	<b>m2*a crop-Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.037235	m2*a crop-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.058958	m2*a crop-Eq
market for electricity, medium voltage   electricity, medium	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.61	m2*a crop-Eq



voltage   Consequential, S - IN- Northern grid			
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.24	m2*a crop- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.18	m2*a crop- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.13	m2*a crop- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.02886 9	m2*a crop- Eq
<b>material resources: metals/minerals - surplus ore potential (SOP)</b>		2.68	<b>kg Cu- Eq</b>
iron pellet production   iron pellet   Consequential, S - CA-QC	241:Manufacture of basic iron and steel / 2410:Manufacture of basic iron and steel	0.02949 7	kg Cu- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.6	kg Cu- Eq
<b>ozone depletion - ozone depletion potential (ODPinfinite)</b>		<b>0.00012 5</b>	<b>kg CFC- 11-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN- Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	7.63E- 06	kg CFC- 11-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S -	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	3.46E- 06	kg CFC- 11-Eq

GLO			
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.000112	kg CFC-11-Eq
<b>particulate matter formation - particulate matter formation potential (PMFP)</b>		0.11	<b>kg PM2.5-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.003249	kg PM2.5-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.076062	kg PM2.5-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.003754	kg PM2.5-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.003461	kg PM2.5-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.017951	kg PM2.5-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.005686	kg PM2.5-Eq
<b>photochemical oxidant formation: human health - photochemical oxidant formation potential: humans (HOFP)</b>		0.13	<b>kg NOx-Eq</b>
ammonia production, steam reforming, liquid   ammonia,	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen	0.011655	kg NOx-Eq

anhydrous, liquid   Consequential, S - UN-SEASIA	compounds		
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN- Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.06867 5	kg NOx- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.01397 4	kg NOx- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00391 5	kg NOx- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01972 2	kg NOx- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00733 2	kg NOx- Eq
<b>photochemical oxidant formation: terrestrial ecosystems - photochemical oxidant formation potential: ecosystems (EOFP)</b>		0.13	<b>kg NOx- Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00137 8	kg NOx- Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01311 3	kg NOx- Eq
market for electricity, medium voltage   electricity, medium voltage	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.06957 6	kg NOx- Eq

Consequential, S - IN-Northern grid			
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.01438 4	kg NOx- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00413 4	kg NOx- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.02031 3	kg NOx- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00802	kg NOx- Eq
<b>water use - water consumption potential (WCP)</b>		<b>0.63</b>	<b>m3</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01971 1	m3
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.27	m3
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.12	m3
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.04283 5	m3

nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.06306 3	m3
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.11	m3

22

23

24 **Table S3: Category wise impacts associated with the use of ultrasonicator for As(III)**  
 25 **removal by Ni-Fe LDH/Ch and 5 cycles of reuse (5REC)**

Name	Category	Inventor y result	Unit	Impact t factor	Unit	Impact result	Unit
<b>land use - agricultural land occupation (LOP)</b>						<b>1.30063</b>	<b>m2*a crop- Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution					0.57684	m2*a crop- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals					0.23763	m2*a crop- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.18077	m2*a crop- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals					0.12562	m2*a crop- Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.05866	m2*a crop- Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products					0.03819	m2*a crop- Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals					0.03705	m2*a crop- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds					0.02872	m2*a crop- Eq
<b>human toxicity: non-carcinogenic - human toxicity potential</b>						<b>104.241</b>	<b>kg 1,4-</b>

<b>(HTPnc)</b>		<b>4</b>	<b>DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	58.59155	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	32.30391	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.30418	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.69445	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.42381	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.36542	kg 1,4-DCB-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	2.18234	kg 1,4-DCB-Eq
<b>ecotoxicity: terrestrial - terrestrial ecotoxicity potential (TETP)</b>		<b>122.7595</b>	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	29.99441	kg 1,4-DCB-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	26.96242	kg 1,4-DCB-Eq
nitric oxide production	201:Manufacture of basic chemicals,	13.8134	kg 1,4-

nitric oxide   Consequential, S - GLO	fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	3	DCB- Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	13.5798 9	kg 1,4- DCB- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.0810 1	kg 1,4- DCB- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	12.0942 8	kg 1,4- DCB- Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	10.2978 1	kg 1,4- DCB- Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.65333	kg 1,4- DCB- Eq
<b>material resources: metals/minerals - surplus ore potential (SOP)</b>		<b>2.7041</b>	<b>kg Cu- Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.58259	kg Cu- Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.03836	kg Cu- Eq
iron pellet production   iron pellet   Consequential, S - CA- QC	241:Manufacture of basic iron and steel / 2410:Manufacture of basic iron and steel	0.02935	kg Cu- Eq
<b>ionising radiation - ionising radiation potential (IRP)</b>		<b>0.83296</b>	<b>kBq Co-60- Eq</b>
market for electricity,	351:Electric power generation, transmission	1.04596	kBq



medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	and distribution / 3510:Electric power generation, transmission and distribution		Co-60-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.05957	kBq Co-60-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.04795	kBq Co-60-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.02604	kBq Co-60-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-0.009	kBq Co-60-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	-0.15404	kBq Co-60-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	-0.17845	kBq Co-60-Eq
<b>photochemical oxidant formation: human health - photochemical oxidant formation potential: humans (HOFP)</b>		<b>0.14814</b>	<b>kg NOx-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.06485	kg NOx-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.02552	kg NOx-Eq
nitric oxide production	201:Manufacture of basic chemicals,	0.01962	kg

nitric oxide   Consequential, S - GLO	fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals		NO <sub>x</sub> - Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.0139	kg NO <sub>x</sub> - Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.0116	kg NO <sub>x</sub> - Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.0073	kg NO <sub>x</sub> - Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.0039	kg NO <sub>x</sub> - Eq
<b>water use - water consumption potential (WCP)</b>		<b>0.63208</b>	<b>m3</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.27031	m3
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.11027	m3
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.10898	m3
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.06275	m3
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.04262	m3
acetic acid production, product in 98% solution state   acetic acid, without water, in 98%	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01961	m3

solution state   Consequential, S - RER			
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.01209	m3
<b>ecotoxicity: freshwater - freshwater ecotoxicity potential (FETP)</b>		<b>6.60289</b>	<b>kg 1,4- DCB- Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	5.20661	kg 1,4- DCB- Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.86975	kg 1,4- DCB- Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.17858	kg 1,4- DCB- Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.10269	kg 1,4- DCB- Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.08375	kg 1,4- DCB- Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.07615	kg 1,4- DCB- Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.06959	kg 1,4- DCB- Eq
<b>human toxicity: carcinogenic - human toxicity potential (HTPc)</b>		<b>2.52989</b>	<b>kg 1,4- DCB- Eq</b>
market for electricity, medium voltage	351:Electric power generation, transmission and distribution / 3510:Electric power	1.54444	kg 1,4- DCB-

electricity, medium voltage   Consequential, S - IN-Northern grid	generation, transmission and distribution		Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.59064	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.09769	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.09455	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.08596	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.07851	kg 1,4-DCB-Eq
<b>photochemical oxidant formation: terrestrial ecosystems - photochemical oxidant formation potential: ecosystems (EOFP)</b>		<b>0.15692</b>	<b>kg NOx-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.0657	kg NOx-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.02988	kg NOx-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.02021	kg NOx-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.01431	kg NOx-Eq
ammonia production, steam reforming, liquid	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics /	0.01305	kg NOx-

ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	2012:Manufacture of fertilizers and nitrogen compounds		Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00798	kg NOx-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00411	kg NOx-Eq
<b>eutrophication: marine - marine eutrophication potential (MEP)</b>		<b>0.00331</b>	<b>kg N-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.00144	kg N-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.00058	kg N-Eq
market for wastewater, average   wastewater, average   Consequential, S - RoW	370:Sewerage / 3700:Sewerage	0.00056	kg N-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.0003	kg N-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00021	kg N-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00017	kg N-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00011	kg N-Eq
market for nickel concentrate, 16% Ni	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of	-9.94E-05	kg N-Eq

nickel concentrate, 16% Ni   Consequential, S - GLO	basic precious and other non-ferrous metals		
<b>energy resources: non-renewable, fossil - fossil fuel potential (FFP)</b>		<b>24.94345</b>	<b>kg oil-Eq</b>
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	8.36464	kg oil-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	8.01788	kg oil-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	4.60596	kg oil-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	1.41485	kg oil-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.99599	kg oil-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.64588	kg oil-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.51446	kg oil-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.34944	kg oil-Eq
<b>ecotoxicity: marine - marine ecotoxicity potential (METP)</b>		<b>8.45332</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of	6.55241	kg 1,4-DCB-

nickel concentrate, 16% Ni   Consequential, S - GLO	basic precious and other non-ferrous metals		Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	1.17017	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.24169	kg 1,4-DCB-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.14942	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.11483	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.10733	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.09678	kg 1,4-DCB-Eq
<b>ozone depletion - ozone depletion potential (ODPinfinite)</b>		<b>0.00013</b>	<b>kg CFC-11-Eq</b>
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00011	kg CFC-11-Eq
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	7.20E-06	kg CFC-11-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S -	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	3.44E-06	kg CFC-11-Eq

GLO			
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	1.98E-06	kg CFC-11-Eq
<b>particulate matter formation - particulate matter formation potential (PMFP)</b>		<b>0.11403</b>	<b>kg PM2.5-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.07183	kg PM2.5-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01786	kg PM2.5-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.00736	kg PM2.5-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00566	kg PM2.5-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00374	kg PM2.5-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00344	kg PM2.5-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00323	kg PM2.5-Eq
<b>acidification: terrestrial - terrestrial acidification potential (TAP)</b>		<b>0.2671</b>	<b>kg SO2-Eq</b>
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.11312	kg SO2-Eq



market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.09069	kg SO2-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.02084	kg SO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01425	kg SO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01267	kg SO2-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00741	kg SO2-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00631	kg SO2-Eq
<b>eutrophication: freshwater - freshwater eutrophication potential (FEP)</b>		<b>0.03379</b>	<b>kg P-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.0229	kg P-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00633	kg P-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00123	kg P-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50%	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00101	kg P-Eq

solution state   Consequential, S - RoW			
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001	kg P-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00059	kg P-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	0.00038	kg P-Eq
<b>climate change - global warming potential (GWP100)</b>		<b>90.29</b>	<b>kg CO2-Eq</b>
market for electricity, medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	30.04151	kg CO2-Eq
electricity production, medium voltage, petroleum refinery operation   electricity, medium voltage   Consequential, S - IN	192:Manufacture of refined petroleum products / 1920:Manufacture of refined petroleum products	29.63303	kg CO2-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.61079	kg CO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	5.21108	kg CO2-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	4.9701	kg CO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.8191	kg CO2-Eq
market for nickel	242:Manufacture of basic precious and other	2.23579	kg

concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals		CO2-Eq
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27 **Table S4: Category wise impacts associated with the use of ultrasonicator for As(III)**  
 28 **removal using renewable source of electricity**

Name	Category	Inventor y result	Unit	Impact factor	Impact result	Unit
<b>land use - agricultural land occupation (LOP)</b>					<b>0.56226</b>	<b>m2*a crop-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals				0.23882	m2*a crop-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds				0.18167	m2*a crop-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals				0.12624	m2*a crop-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds				0.05896	m2*a crop-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals				0.03725	m2*a crop-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds				0.02887	m2*a crop-Eq
market for water, deionised   water, deionised   Consequential, S - RoW	360:Water collection, treatment and supply / 3600:Water collection, treatment and supply				0.01226	m2*a crop-Eq
market for electricity, medium voltage, renewable energy	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution				-0.12571	m2*a crop-Eq

products   electricity, medium voltage, renewable energy products   Consequential, S - CH			
<b>human toxicity: non-carcinogenic - human toxicity potential (HTPnc)</b>		<b>73.41173</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	58.88451	kg 1,4-DCB-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	3.32096	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.3207	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.70792	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.43593	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	2.37725	kg 1,4-DCB-Eq
<b>ecotoxicity: terrestrial - terrestrial ecotoxicity potential (TETP)</b>		<b>91.53543</b>	<b>kg 1,4-DCB-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	30.14438	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	13.8825	kg 1,4-DCB-Eq

market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	13.64779	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.14641	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	12.15475	kg 1,4-DCB-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	5.66018	kg 1,4-DCB-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	2.66776	kg 1,4-DCB-Eq
<b>material resources: metals/minerals - surplus ore potential (SOP)</b>		2.67311	<b>kg Cu-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.5955	kg Cu-Eq
iron pellet production   iron pellet   Consequential, S - CA-QC	241:Manufacture of basic iron and steel / 2410:Manufacture of basic iron and steel	0.0295	kg Cu-Eq
<b>ionising radiation - ionising radiation potential (IRP)</b>		-0.27453	<b>kBq Co-60-Eq</b>
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.0599	kBq Co-60-Eq
ammonia production,	201:Manufacture of basic chemicals,	0.02617	kBq

steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds		Co-60-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	-0.00562	kBq Co-60-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-0.00905	kBq Co-60-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	-0.01259	kBq Co-60-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	-0.15481	kBq Co-60-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	-0.17935	kBq Co-60-Eq
<b>photochemical oxidant formation: human health - photochemical oxidant formation potential: humans (HOFP)</b>		0.05937	<b>kg NOx-Eq</b>
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01972	kg NOx-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.01397	kg NOx-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01166	kg NOx-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00733	kg NOx-Eq

nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00391	kg NOx-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.00132	kg NOx-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00118	kg NOx-Eq
<b>water use - water consumption potential (WCP)</b>		0.90102	<b>m3</b>
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.3877	m3
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.27166	m3
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.11082	m3
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.06306	m3
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.04284	m3
acetic acid production, product in 98% solution state   acetic acid,	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01972	m3

without water, in 98% solution state   Consequential, S - RER			
<b>ecotoxicity: freshwater - freshwater ecotoxicity potential (FETP)</b>		5.8888	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	5.23265	kg 1,4-DCB-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.23014	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.17947	kg 1,4-DCB-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.08416	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.07653	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.06994	kg 1,4-DCB-Eq
<b>human toxicity: carcinogenic - human toxicity potential (HTPc)</b>		<b>1.08644</b>	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.59359	kg 1,4-DCB-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage,	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.11853	kg 1,4-DCB-Eq



renewable energy products   Consequential, S - CH			
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.09817	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.09503	kg 1,4-DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.08639	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.0789	kg 1,4-DCB-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.0163	kg 1,4-DCB-Eq
<b>photochemical oxidant formation: terrestrial ecosystems - photochemical oxidant formation potential: ecosystems (EOFP)</b>		0.06303	<b>kg NOx-Eq</b>
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.02031	kg NOx-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.01438	kg NOx-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01311	kg NOx-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00802	kg NOx-Eq
nitric acid production, product in 50% solution state   nitric acid, without	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and	0.00413	kg NOx-Eq

water, in 50% solution state   Consequential, S - RoW	nitrogen compounds		
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.00139	kg NOx-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00138	kg NOx-Eq
<b>eutrophication: marine - marine eutrophication potential (MEP)</b>		<b>0.00134</b>	<b>kg N-Eq</b>
market for wastewater, average   wastewater, average   Consequential, S - RoW	370:Sewerage / 3700:Sewerage	0.00056	kg N-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00031	kg N-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00021	kg N-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00017	kg N-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00011	kg N-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	6.13E-05	kg N-Eq
acetic acid production,	201:Manufacture of basic chemicals,	2.07E-	kg N-

product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	05	Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	-1E-04	kg N-Eq
<b>energy resources: non-renewable, fossil - fossil fuel potential (FFP)</b>		8.65408	<b>kg oil-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	4.62899	kg oil-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	1.42192	kg oil-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	1.00097	kg oil-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.64911	kg oil-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.51703	kg oil-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.35134	kg oil-Eq
<b>ecotoxicity: marine - marine ecotoxicity potential (METP)</b>		7.45976	<b>kg 1,4-DCB-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	6.58517	kg 1,4-DCB-Eq
market for electricity,	351:Electric power generation, transmission	0.2903	kg 1,4-

medium voltage   electricity, medium voltage   Consequential, S - IN-Northern grid	and distribution / 3510:Electric power generation, transmission and distribution		DCB-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.2429	kg 1,4-DCB-Eq
urea	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.11541	kg 1,4-DCB-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.10787	kg 1,4-DCB-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.09727	kg 1,4-DCB-Eq
<b>ozone depletion - ozone depletion potential (ODP<sub>infinite</sub>)</b>		0.00012	<b>kg CFC-11-Eq</b>
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00011	kg CFC-11-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	6.29E-06	kg CFC-11-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	3.46E-06	kg CFC-11-Eq
<b>particulate matter formation - particulate matter formation potential (PMFP)</b>		0.03493	<b>kg PM2.5-Eq</b>
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.01795	kg PM2.5-Eq

urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00569	kg PM2.5-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00375	kg PM2.5-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00346	kg PM2.5-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00325	kg PM2.5-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00057	kg PM2.5-Eq
<b>acidification: terrestrial - terrestrial acidification potential (TAP)</b>		0.15696	<b>kg SO2-Eq</b>
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.11368	kg SO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01432	kg SO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.01273	kg SO2-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00744	kg SO2-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous,	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and	0.00635	kg SO2-Eq

liquid   Consequential, S - UN-SEASIA	nitrogen compounds		
<b>eutrophication: freshwater - freshwater eutrophication potential (FEP)</b>		<b>0.01164</b>	<b>kg P-Eq</b>
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	0.00636	kg P-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.00124	kg P-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.00109	kg P-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00102	kg P-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.001	kg P-Eq
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	0.00059	kg P-Eq
market for wastewater, average   wastewater, average   Consequential, S - RoW	370:Sewerage / 3700:Sewerage	0.00025	kg P-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.0002	kg P-Eq
market for water, deionised   water, deionised   Consequential, S - RoW	360:Water collection, treatment and supply / 3600:Water collection, treatment and supply	-0.00012	kg P-Eq
<b>climate change - global warming potential (GWP100)</b>		<b>31.2141</b>	<b>kg</b>

		<b>4</b>	<b>CO2-Eq</b>
ammonia production, steam reforming, liquid   ammonia, anhydrous, liquid   Consequential, S - UN-SEASIA	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	13.6788 5	kg CO2-Eq
nitric acid production, product in 50% solution state   nitric acid, without water, in 50% solution state   Consequential, S - RoW	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	5.23714	kg CO2-Eq
nitric oxide production   nitric oxide   Consequential, S - GLO	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	4.99495	kg CO2-Eq
urea production   urea   Consequential, S - CN	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2012:Manufacture of fertilizers and nitrogen compounds	3.8382	kg CO2-Eq
market for nickel concentrate, 16% Ni   nickel concentrate, 16% Ni   Consequential, S - GLO	242:Manufacture of basic precious and other non-ferrous metals / 2420:Manufacture of basic precious and other non-ferrous metals	2.24697	kg CO2-Eq
acetic acid production, product in 98% solution state   acetic acid, without water, in 98% solution state   Consequential, S - RER	201:Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics / 2011:Manufacture of basic chemicals	0.64768	kg CO2-Eq
market for electricity, medium voltage, renewable energy products   electricity, medium voltage, renewable energy products   Consequential, S - CH	351:Electric power generation, transmission and distribution / 3510:Electric power generation, transmission and distribution	0.44588	kg CO2-Eq

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