Supplementary information to "Developing a Triple Helix Approach for CO_2 Utilisation Assessment"

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Table 1 ESI Selected subcategories and their application to CDU social impact assessment (full framework)

Stakeholder	UNEP subcategory	Aims of UNEP subcategory assessment	Relevance to identified CDU assessment scope	Suggested indicator(s)	Typical data inputs used for assessing indicator	Suggested external data sources
Local Community	Delocalisation & migration	Assess the contribution to delocalization, migration or 'involuntary resettlement' within communities	Changes in land use at scale for economic development can be a driving factor in the creation of displaced persons	Likelihood of forced evictions for technology implementation	Process design calculations, LCI data, geographical data (land use), regional/national data on forced resettlement/compulsory purchase orders etc.	OECD land resources statistics
	Local employment	Assesses how an organization directly or indirectly affects local employment.	CDU technologies could bring changes to employment opportunities both directly & indirectly, more so if the supply chain is localised	Operational impact on local employment - direct	Process design calculations, labour estimation calculations, employment & labour statistics	World Bank development indicators (employment), national employment & labour statistics
				Operational impact on local employment - indirect	Employment & labour statistics, IRENA employment statistics, COMTRADE-type data	World Bank development indicators (employment), national employment & labour statistics
	Access to material resources	Assess the extent to which organizations respect/protect/ improve community access to material resources & infrastructure.	CDU technologies can impact positively & negatively access to resources such as (renewable) electricity, water, land & other products. Additional strains on areas known to be water/land/energy (renewable & not) constrained may cause problems for communities. Operations may also impact access to material produce negatively (consuming limited resources) or positively (increasing domestic security of supply)	Operational impact on local land-use & zoning	Process design calculations, LCI data, geographical data (land use)	OECD land resources statistics
				Changes to local water supply & security	Process design calculations, LCI data, water scarcity data for country/region	UN AQUASTAT database, national reports/statistics (regional perspective)
				Changes to local electricity & energy supply	Process design calculations, LCI data, national electricity/energy statistics (e,g, DUKES)	World bank WDI & SE4ALL databases, national reports/statistics on electricity & energy consumption/provision
				Changes to local access to material produce	COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases,

						Observatory of economic complexity data
	Safe & healthy living conditions	Assess how organizations impact community safety & health	Potential risks and benefits of CDU plant operation on the communities safety & health should be assessed to determine potential impacts on the local community (considering both regular operation & accident potential)	Impact on air quality & pollution levels	Process design calculations, LCI data	World Bank WDI database
				Utilisation & risks associated with the use of hazardous substances in the operation	Chemical safety data, LCI data, HAZOP studies	COSHH database, ILO International Chemicals Safety Cards database
Value Chain Actors	Promoting social responsibility	Assess whether the organisation promotes social responsibility through its actions & among its suppliers	Choices made in technology development/deployment may have unintended impacts on value chains and communities involved in these chains. CDU processes offer the potential to utilise 'waste' streams	Potential for and impact of integration of waste materials into the supply chain	LCI data	LCI databases
				Risk of utilisation of illicit or conflict materials within supply chain	LCI data, COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases, Observatory of economic complexity data
Consumers	Consumer health & safety	Assess the existence & scope of systematic efforts to address consumer health & safety across the life cycle	Whilst always beneficial, assessing risks to the H&S of consumers is of particular importance if a new CDU product fulfils the same function of an existing product whilst being chemically non identical – e.g. DME as a fuel	Consumer health & safety risk	Process design calculations, LCI data, Chemical safety data	COSHH database, ILO International Chemicals Safety Cards database
	End of life (EoL) responsibility	Assess management efforts to address the social impacts of product or service end-of-life	Understanding EoL protocol (ease of recyclability/recovery/disposal) is important as an element of the circular economy. Also of interest is the potential impact on health for improper disposal	Recyclability of product & process elements	Process design calculations, LCI data	LCI databases
				Potential health risks for improper disposal of product & process elements	Chemical safety data	COSHH database, ILO International Chemicals Safety Cards database
Workers	Child labour	Assess whether the organization is employing child labour as defined by ILO conventions & to identify the nature of any child labour	Choices made in technology development/deployment may have unintended consequences regarding child labour utilisation	Potential for utilization of child labour in supply chain	Process design calculations, LCI data, COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases, Observatory of economic complexity data
	Forced Labour	Assess whether there is the use of forced labour in the organization	Choices made in technology development/deployment may have unintended consequences regarding forced labour utilisation	Potential for utilization of forced labour in supply chain	Process design calculations, LCI data, COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases, Observatory of economic complexity data
	Equal Opportunities	Assess whether there is any worker	Choices made in technology	Potential for supporting	Process design calculations, LCI data,	UN COMTRADE, EU PRODCOM

		discrimination present in the organization	development/deployment may have unintended consequences regarding workplace discrimination	discriminatory practices in supply chain	COMTRADE-type data & national production/market statistics	& OECD databases, Observatory of economic complexity data
	Worker H&S	Assess the rate of workplace incidents and prevention/management processes	It is widely understood there is a need to assess potential H&S risks in manufacturing	Risk to the H&S of workers associated with operation	ILO data on national workplace accident rate, HAZOP studies, chemical safety data	COSHH database, ILO International Chemicals Safety Cards database, ILO H&S data
Society	Public commitment to sustainability issues	Assess to what extent the organization is engaged in reducing its 'sustainability impacts' – including public & internal targets	This indicator has been changed to consider societal commitment to sustainable development	Societal & political support for sustainability initiatives that may impact the operation	IRENA energy profiles, UN SDG index scores	IRENA energy profiles, SDG index scores
	Prevention & mitigation of conflicts	Assess the organizations role in conflicts or situations that may lead to conflict (violent & non-violent)	Technologies have the potential to contribute to conflict instigation through the use of materials and labour along the supply chain	Risk of utilising of goods/materials/services from areas of conflict	LCI data, COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases, Observatory of economic complexity data
	Contribution to economic development	Assess to what extent the organization/product/service contributes to the economic development of the country	Technologies & development choices have the potential to aid (or hinder) in contributing to economic development beyond local communities	Utilisation of national supply chains over international	LCI data, COMTRADE-type data & national production/market statistics	UN COMTRADE, EU PRODCOM & OECD databases, Observatory of economic complexity data

Table 2 EIS: Inventory Data for CDU and Sub-processes

Item	Amine CC for 1 t CO_2/ [1,2]	Hydrogen for 1 t/h[3]	Wind per 1 kWh[4]	Solar per 1 kWh[4]	Methanol 1 t/h[3]	Polymers 1 t[5]	Mineralisation per kg carbonated block[6]
Electricity	36-202 kWh/t depending on if CHP available	52 MW	-	-	0.17 MWh	0.01 kwh/kg polyol	0.03 kWh/kg
Heat	Steam 3.7-4.4 GJ or 3.6 GJ from Nat Gas if CHP	-	-	-	0.44 MWh, saturated steam 25bar	0.05 kg steam/kg polyol = 0.14 MJ/kg	0.06 KWh/kg thermal heat
Water	Water needed for amine make up, washing and cooling recycling system used	9.4 t/h deionised water	1 kg/kWh	Average 0.9 kg/kWh to max 4 kg/kWh[7]	4.4 t/h cooling water, 0.03 t/h boiler water	1.14 kg/kg polypol cooling, 0.55 kg/kg polyol chilled water	0.11 kg/kg

Raw materials	Amines needed for capture	Pt or Pd Cathode, IrO_2 or RuO_2 anode[8]	-	Several toxic, flammable and explosive chemicals associated with manufacture	0.102 kg/h catalyst $Cu/ZnO/Al_2O_3$, 1.46 t CO_2/t MeOH, 0.199 t H_2/t MeOH	PO 0.81kh/kg polyol (0.16 less than conventional) all other feeds same as conventional, 0.23 kg CO_2/kg polyol, double metal cyanide catalyst	0.48 kg sand/kg and 0.48 kg stainless steel slag, 0.09kg CO_2/kg
Wastes	-	0.45 t/h waste water	-		0.56 t/h	-	0.09 kg waste water/kg
Emissions	1.5 kg MEA per ton CO_2 captured to flue gas, water and degradation	-	25 g CO_2/kWh minor noise issues	90 g CO_2/kwh	0.077 t/h CO_2	No delta from reference. Lower CO_2 emission.	Unknown
Land	-	Small for plant, large for electricity	44.7 acres/MW	6.1 acres/MW issues with land competition for siting solar farms	-	-	-
H&S issues	-	H_2 storage	Bird strikes	-	-	-	-

Table 3 EIS Full Impact calculation table for Methanol in 3 locations

Subcategory	Indicator	Data Calculation method and Data sources	Scoring method	MeOH UK Wind	MeOH UK Solar	MeOH China Wind	MeOH China Solar	MeOH Chile Wind	MeOH Chile Solar	Justification
Delocalisation & migration	Likelihood of forced evictions for technology implementation	Calculate land area needed (factor in electricity source if dedicated), web search for history of forced evictions/compulsory purchases etc. to factor into risk	0 = no risk 1 = low risk 2 = med risk 3 = high risk 4 = very high risk	0	0	1	2	1	1	Reasonably low risk of displacement for economic development, wind needs larger area though likely offshore. Forced eviction most prevalent in Asia followed by Latin America
Local employment	Locals directly employed due to activity	Process data & calculations, estimation from NOL for operators, local unemployment figures, average salary in	0 = numerous, above local average pay jobs created 1 = high number of jobs created	1	0	1	0	1	0	Higher job creation in solar energy than wind (x2-3 times greater per MW)

		region vs average salary of plant operator in region	2 = medium level of jobs created 3 = low level of jobs created 4 = no benefit to local pop – zero jobs							
	Locals indirectly employed due to activity	IRENA employment calculations, COMTRADE/BP to check if process inputs can be sourced locally	0= highly localized supply chain 1 = predominately local supply chain 2 = mixed location supply chain 3 = mainly international supply chain 4 = no benefit	1	1	1	1	1	1	Localised supply apart from catalysts
Access to MR	Changes to local land use	Calculate land area needed (factor in electricity source if dedicated) and consideration for how much space is available	0=minimal issues 1= low 2= moderate 3=high 4=Significant issues	1	4	2	1	2	1	China and Chile have considerable prospects for solar deployment. UK has access to large wind resources, though land for solar an issue
	Changes to local water supply & security	https://worldwater.io/ Consideration of water scarcity within the country compared to amount of water needed for production	0=minimal issues 1= low 2= moderate 3=high 4=Significant issue	2	2	1	2	2	2	China has low level of people living in water scarce areas (36%) UK and Chile are higher (46% and 52% respectively).
	Changes to local electricity supply	https://www.irena.org/Statistics/Statistical-Profiles Consideration of amount electricity needed per FU and amount of solar or wind energy produced per country	0=minimal issues with capacity (or dedicated supply) 1= low with capacity 2= moderate with capacity 3=high with capacity 4=Significant issue with capacity	2	3	1	1	4	3	Electricity demand for MeOH production is high due to water electrolysis for H2. China has least capacity issues, UK wind has greater potential for expansion. Solar & wind capacity are small in Chile, where hydro is dominant renewable energy source
	Changes to local access to material produced	https://comtrade.un.org/ Consideration of how much methanol is imported and exported	0= very high change 1= high significant change 2= moderate change 3=small change 4=no change	2	2	2	2	4	4	Chile exports large amount of methanol. UK and China import more methanol than they export so this will increase local security of supply.
Safe & Healthy Living conditions (LC)	Impact on air quality/pollution levels - production	http://wdi.worldbank.org/table/WV.3 Using the air pollution data per country and adding possible additional air pollution from process	0= no/positive impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	0	0	2	2	1	1	Air pollution is worst in China and best in UK. The amines from the capture process will add to local air pollution.
	Utilisation of hazardous substances in	Consideration of the hazards created raw materials used in process, storage and transportation of product. Use of Hazop	0= no impact 1 = low impact 2 = medium impact	2	2	2	2	2	2	Use of amines and H_2 (H_2 needs storage)

	process	data for materials.	3 = high impact 4 = very high impact							
Promoting social responsibility	Use of wastes and other sustainably materials	Consideration of how many raw material as sourced from waste or are sustainable	0= very high use of sustainable/wastes 1 = high use 2 = medium use 3 = low use 4 = no use/unstainable	1	1	1	1	1	1	Inputs are sustainable as renewable H_2 production is used, however electrodes use platinum group metals
	Social responsibility in supply chain	Risk of utilisation of illicit or conflict materials within supply chain https://www.usgs.gov/centers/nmic/platinum-group-metals-statistics-and-information	0= no risk 1 = low risk 2 = medium risk 3 = high risk 4 = very high risk	1	1	1	1	1	1	Platinum group metals used but sustainable reporting is common for the metals therefore sustainably producer could be chosen
Consumer health & safety	Consumer health & safety risk	Consideration as to whether product poses any consumer H&S issues. Data from COSHH	0= no risk 1 = low risk 2 = medium risk 3 = high risk 4 = very high risk	2	2	2	2	2	2	Methanol predominantly used in industry rather than by consumers, however poses acute health hazards for oral , dermal and inhalation toxicity and is highly flammable.
EOL responsibility	Recyclability of product & process elements	Consideration of raw materials, wastes and products in respect to their ability to be recycled. Consideration of ease of recycling.	0= no impact/ easily fully recyclable 1 = low impact/some issues recycling 2 = medium impact/ recycling + end of life pyrolysis/energy recovery 3 = high impact/ recycling via DAC 4 = very high impact/ cannot be recycled	3	3	3	3	3	3	Methanol is not a product able to be recycled directly is going to emit CO_2, can be recycled by air capture of CO_2
	Potential health risks for improper disposal of product & process elements	Potential impact on health, data from knowledge of process elements and product disposal.	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	1	1	1	1	1	1	No issues for product disposal, high use of electrolysers for H_2 = disposal of used electrodes
Child labour	Potential for utilization of child labour in supply chain	http://wdi.worldbank.org/table/2.6 Likelihood that their might be child labour occurring in supply chain and scenario country	0= no likelihood 1 = low likelihood 2 = medium likelihood 3 = high likelihood 4 = very high likelihood	0	0	0	0	1	1	Chile has low levels of child labour though these are mainly concentrated in the services and agricultural industries.
Forced labour	Potential for utilization of forced labour in supply chain	Consideration of likelihood of forced labour in supply chain and impact http://ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_575479.pdf	0= no likelihood 1 = low likelihood 2 = medium likelihood 3 = high likelihood 4 = very high likelihood	1	1	1	1	1	1	Higher risk in Africa, Asia and Pacific. Metal catalysts likely to be sourced from Africa however quantities needed are low.

Equal Opportunities	Potential for supporting discriminatory practices in supply chain	Labour force participation rate in the country. Data from World Bank regarding employment in location.	0= no likelihood of supporting discrimination 1 = low likelihood 2 = medium likelihood 3 = high likelihood 4 = very high likelihood	0	0	1	1	0	0	UK and Chile have high levels of female employment. China has much lower levels of employment which could lead to discriminatory practice.
Worker health & safety	Worker health & safety risk	Country H&S data and consideration of process https://ilostat.ilo.org/topics/safety-and-health-at-work/	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	2	2	2	2	3	3	H_2 storage & transportation and possible exposure to amines are biggest issues regarding H&S. UK has a better H&S Chile. Unknown for China
Public commitment to sustainability issues		Irena Energy profiles, commitment to renewable energy targets and frequency of environmental policy http://solability.com/the-global-sustainable-competitiveness-index/the-index https://www.sdgindex.org/	0= very high 1 = high commitment 2 = medium commitment 3 =low commitment 4 = no commitment	1	1	2	2	2	2	Chile has very high renewable energy targets, but with China is lower in the Global sustainable competitiveness ranking than UK
Prevention & mitigation of conflicts	Potential for utilisation of goods/materials/services	Consideration of sources of raw materials for the process. Are these from areas with conflict or could alternative sourcing contribute to mitigation?	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	1	1	1	1	1	1	All countries would likely be sourcing metals externally therefore rankings similar.
Contribution to economic development	Use of local supply chain	How many raw materials can be sourced local reducing demand for imports and therefore increasing local economy.	0= very high use 1 = high use 2 = medium use 3 = low use 4 = no use	1	1	1	1	1	1	Raw materials apart from metals can all be sourced locally, only CO_2 and water required.

Table 4 EIS Full Impact calculation table for comparison of methanol, polymers and minerals via CDU in UK scenario

Subcategory	Indicator	Data Calculation method and Data sources	Scoring method – where 2 scoring methods are given, average of both scores is calculated	MeOH UK Wind	MeOH UK Solar	Polymer UK Wind	Polymer UK Solar	Mineral UK Wind	Mineral UK Solar	Justification
Delocalisation & migration	Likelihood of local forced evictions for technology implementation	Calculate land area needed (factor in electricity source if dedicated), web search for history of forced evictions/compulsory purchases etc to factor into risk	0 = no risk 1 = low risk 2 = med risk 3 = high risk 4 = very high risk	0	0	0	0	0	0	Highly unlikely in UK scenario, most land used for MeOH solar but this likely to be agricultural land
Local employment	Locals directly employed due to activity	Process data & calculations, estimation from NOL for operators, local unemployment figures, average salary in region vs average salary of plant operator in region	0 = numerous, above local average pay jobs created 1 = high number of jobs created 2 = medium level of jobs created 3 = low level of jobs created 4 = no benefit to local pop – zero jobs	1	0	3	3	3	3	Higher job creation in solar energy than wind (x2-3 times greater per MW), however polymer and minerals use much lower levels of renewable energy therefore just
	Locals indirectly employed due to activity	IRENA employment calculations,COMTRADE/BP to check if process inputs can be sourced locally	0= highly localized supply chain 1 = predominately local supply chain 2 = mixed location supply chain 3 = mainly international supply chain 4 = no benefit	1	1	1	1	0	0	Localised apart from catalysts, for mineralisation use of waste local materials
Access to MR	Changes to local land use	Calculate land area needed (factor in electricity source if dedicated) and consideration for how much space is available	0=minimal issues 1= low 2= moderate 3=high 4=Significant issues	2	4	1	1	1	1	UK has access to large offshore wind resources, though land for solar an issue. Electricity demand for MeOH highest.
	Changes to local water supply & security	https://worldwater.io/ Consideration of water scarcity within the country compared to amount of water needed for production	0=minimal issues 1= low 2= moderate 3=high 4=Significant issue	2	3	0	0	0	1	Minimal water needed for Polymers and Minerals, though solar had high water demand per MWh
	Changes to local electricity supply	https://www.irena.org/Statistics/Statistical-Profiles Consideration of amount electricity needed per FU and amount of solar or wind energy produced per country	0=minimal issues with capacity (or dedicated supply) 1= low with capacity 2= moderate with capacity 3=high with capacity 4=Significant issue with capacity	2	2	0	0	0	0	MeOH has high electricity demand due to H_2 production.
	Changes to local access to material produced	https://comtrade.un.org/ Consideration of how much methanol is imported and exported	0=very high change 1= high significant change 2= moderate change 3=small change 4=no change	2	2	3	3	4	4	More methanol is imported than exported, Polyurethane imports and exports are similar and high value, mineral imports are lower value
Safe & Healthy Living	Impact on air quality/pollutio	http://wdi.worldbank.org/table/WV.3 Using the air pollution data per country	0= no/positive impact 1 = low impact							Mineralisation has potential to be carbon negative technology reducing

conditions (LC)	n levels - production	and adding possible additional air pollution from process	2 = medium impact 3 = high impact 4 = very high impact							CO_2 levels
	Utilisation of hazardous substances in process	Consideration of the hazards created raw materials used in process, storage and transportation of product. Use of Hazop data for materials.	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	2	2	0	0	0	0	Use of amines and H_2 (H_2 needs storage) for MeOH. Much lower level of amine needed for polymers and minerals
Promoting social responsibility	Use of wastes and other sustainably materials	Consideration of how many raw material as sourced from waste or are sustainable	0= very high use of sustainable/wastes 1 = high use 2 = medium use 3 = low use 4 = no use/unstainable	1	1	2	2	0	0	Mineralisation uses wastes as feedstocks, methanol uses some platinum group metals for electrolysis, polymers use more materials that could be sourced from fossil resources, care needs to be taken to reduce this.
	Social responsibility in supply chain	Risk of utilisation of illicit or conflict materials within supply chain	0= no risk 1 = low risk 2 = medium risk 3 = high risk 4 = very high risk	1	1	1	1	0	0	Metal catalyst and electrode metals have very low possibility of being sourced illicitly or from conflict areas.
Consumer health & safety	Consumer health & safety risk	Consideration as to whether product poses any consumer H&S issues. Data from COSHH	0= no risk 1 = low risk 2 = medium risk 3 = high risk 4 = very high risk	2	2	0	0	0	0	Methanol predominantly used in industry rather than by consumers, however poses acute health hazards for oral , dermal and inhalation toxicity and is highly flammable
EOL responsibility	Recyclability of product & process elements	Consideration of raw materials, wastes and products in respect to their ability to be recycled. Consideration of ease of recycling.	0= no impact/ easily fully recyclable 1 = low impact/some issues recycling 2 = medium impact/ recycling + end of life pyrolysis/energy recovery 3 = high impact/ recycling via DAC 4 = very high impact/ cannot be recycled	3	3	2	2	0	0	Methanol is not a product able to be recycled directly is going to emit CO_2, can be recycled by air capture of CO_2. Polymers recycled until end of life. Minerals do not need recycling, though can be crushed and reused
	Potential health risks for improper disposal of product & process elements	Potential impact on health, data from knowledge of process elements and product disposal.	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	1	1	0	0	0	0	No issues for product disposal, high use of electrolysers for H_2 = disposal of used electrodes
Child labour	Potential for utilization of child labour in supply chain	http://wdi.worldbank.org/table/2.6 Likelihood that their might be child labour occurring in supply chain and scenario country	0= no likelihood 1 = low likelihood 2 = medium likelihood 3 = high likelihood 4 = very high likelihood	1	1	0	0	0	0	MeOH uses high level of catalyst/rare metals which can be sourced from areas using child labour
Forced labour	Potential for utilization of	https://ilostat.ilo.org/	0= no likelihood 1 = low likelihood							MeOH uses high level of catalyst/rare metals which can be sourced from

	forced labour in supply chain	http://ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_575479.pdf	2 = medium likelihood 3 = high likelihood 4 = very high likelihood							areas using forced labour
Equal Opportunities	Potential for supporting discriminatory practices in supply chain	Labour force participation rate in the country. Data from World Bank regarding employment in location.	0= no likelihood 1 = low likelihood 2 = medium likelihood 3 = high likelihood 4 = very high likelihood	1	1	1	1	0	0	Not likely in UK however could play a factor within supply chain of metals for catalysts
Worker health & safety	Worker health & safety risk	Country H&S data and consideration of process https://ilostat.ilo.org/topics/safety-and-health-at-work/	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	2	2	1	1	1	1	H_2 storage & transportation and possible exposure to amines are biggest issues regarding H&S for MeOH.
Public commitment to sustainability issues		Irena Energy profiles, commitment to renewable energy targets and frequency of environmental policy http://solability.com/the-global-sustainable-competitiveness-index/the-index https://www.sdgindex.org/	0= very high 1 = high commitment 2 = medium commitment 3 = low commitment 4 = no commitment	1	1	2	2	1	1	MeOH could be included in renewable energy targets and help with grid balancing, mineralisation can count towards net zero targets as a carbon dioxide sink
Prevention & mitigation of conflicts	Potential for utilisation of goods/materials /services	Consideration of sources of raw materials for the process. Are these from areas with conflict or could alternative sourcing contribute to mitigation?	0= no impact 1 = low impact 2 = medium impact 3 = high impact 4 = very high impact	1	1	0	0	0	0	High level of catalyst used for MeOH which may be sourced from unstable regions.
Contribution to economic development	Use of local supply chain	How many raw materials can be sourced local reducing demand for imports and therefore increasing local economy.	0= very high use 1 = high use 2 = medium use 3 = low use 4 = no use	1	1	2	2	0	0	Mineralisation recycles waste products, MeOH predominantly local supply chain though catalysts not local, PO may be externally sourced for polymers

Notes and references

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