

Appendix B: List of biomass application terms and variants

CATEGORY	APPLICATION TERM	VARIANTS OF THE TERM	REFERENCES
ANIMAL_FEED	animal_feed	animal_feed; animal_feed_supplement; animal_feed_protein; food_and_animal_feed; food_and_animal_feed_industries; animal_diet; feed_products; feed_formulation; poultry_feed; herbal_feed_additives; different_feed_additives; fodder_production; animal_fodder; forage; forage_crop; forage_crops; perennial_forage; forage_source; grass_forage; other_forages; fresh_forage; perennial_forages; forage_grass; forage_types; livestock_biomass; grazed_biomass; concentrate; concentrate_mixtures; concentrate_mix; concentrate_intake; compound_feed; pet_food; pet_feed	
CHEMICALS			[1-6]
CHEMICALS	acetaldehyde	acetaldehyde; gaseous_acetaldehyde; ch3cho	
CHEMICALS	acetic_acid	acetic_acid; acetic_acid_(ch3cooh); acetic_acid_solutions; pure_acetic_acid; high_acetic_acid; e.g._acetic_acid; acetic_and_propionic_acid; acetic_and_formic_acid; more_acetic_acid	
CHEMICALS	oxalic_acid	oxalic_acid; dilute_oxalic_acid; aqueous_oxalic_acid; oxalic_and_acetic_acids; acetic_and_oxalic_acids; crystalline_oxalic_acid; oxalic_and_oxamic_acids	
CHEMICALS	ethylene_glycol	ethylene_glycol; (ethylene_glycol; mono_ethylene_glycol; ethylene_glycol_steam; ethylene_glycol_ethers; water_and_ethylene_glycol	
CHEMICALS	ethylene_oxide	ethylene_oxide; ethylene_oxidation	
CHEMICALS	glyoxylic_acid	glyoxylic_acid	
CHEMICALS	3-hydroxypropionic_acid	3-hydroxypropionic_acid; -hydroxypropionic; hydroxy_propionic_acid	
CHEMICALS	lactic_acid	lactic_acid; (lactic_acid; )_lactic_acid; (l_lactic_acid; g_lactic_acid; e.g._lactic_acid; more_lactic_acid; lactic_acid_formation; lactic_and_acetic_acid; lactic_acid_content; mainly_lactic_acid; lactic_acid_conversion; acetic_and_lactic_acid; lactic_acid_productivity	
CHEMICALS	malonic_acid	malonic_acid	
CHEMICALS	propionic_acid	propionic_acid; propionic_acids; acetic_and_propionic_acid; propionic_and_butyric_acids; propionic_acid_accumulation; especially_propionic_acid; hydroxy_propionic_acid	
CHEMICALS	acetone	acetone; acetone&butanol; solvent_acetone; (acetone; acetone_results; acetone_solution; acetone_condensation; acetone_concentration; acetone_butanol_ethanol_mixture; acetone_n_butanol_ethanol; acetone_content; acetone_conversions	
CHEMICALS	1,2-propanediol	1,2-propanediol	
CHEMICALS	1,3-propanediol	1,3-propanediol	
CHEMICALS	acetoin	acetoin	
CHEMICALS	aspartic_acid	aspartic_acid; aspartic; aspartic_and_glutamic_acids; glutamic_and_aspartic_acids	
CHEMICALS	fumaric_acid	fumaric_acid; fumaric_acid_production; fumaric_acid_recovery; fumaric_acid_biosynthesis; bio_based_fumaric_acid; conventional_fumaric_acid_fermentation; fumaric_acid_monoethyl; fumaric_acid_monoethyl_ester	
CHEMICALS	3-hydroxybutyrolactone	3-hydroxybutyrolactone	
CHEMICALS	malic_acid	malic_acid; malic_acids; polymalic_acid; citric_and_malic_acids; malic_and_citric_acids; mainly_malic_acid; l_malic_acid; poly(malic_acid	
CHEMICALS	succinic_acid	succinic_acid; succinic_acid_productivity; succinic_acid_fermentation; final_succinic_acid_concentration; fermentation_derived_succinic_acid; efficient_succinic_acid_production; economical_succinic_acid_production; bio_based_succinic_acid_production; homo_succinic_acid_production; bio_based_succinate_production; bio_based_succinate	
CHEMICALS	2,3-butanediol	2,3-butanediol	
CHEMICALS	1,4-butanediol	1,4-butanediol	
CHEMICALS	1,2,4-butanetriol	1,2,4-butanetriol	
CHEMICALS	arabinitol	arabinitol; arabitol	
CHEMICALS	furfural	furfural; furfural_(hmf; -furfuraldehyde; furfural_formation; furfural_and_acetic_acid; furfural_conversion	
CHEMICALS	glutamic_acid	glutamic_acid; d_glutamic_acid; aspartic_and_glutamic_acids; glutamic_acid_production; glutamic_and_aspartic_acids; poly(l^3_glutamic_acid; glutamate; glutamate_synthase; glutamate_production	
CHEMICALS	glutaric_acid	glutaric_acid	
CHEMICALS	itaconic_acid	itaconic_acid; itaconic_acid_yields; renewable_itaconic_acid	
CHEMICALS	levulinic_acid	levulinic_acid; to_levulinic_acid; hydroxymethylfurfural_and_levulinic_acid; derived_levulinic_acid; renewable_levulinic_acid; furfural_and_levulinic_acid; levulinic_acid_yield; bio_based_levulinic_acid; levulinic_acid_hydrogenation	
CHEMICALS	xylitol	xylitol; xylitol_yield; xylitol_formation; xylitol_productivity; biotechnological_xylitol_production; xylitol_concentration; biomass_derived_xylitol; nearly_%_xylitol_conversion; xylitol_bioproduction; xylitol_hydrogenolysis	
CHEMICALS	xylonic_acid	xylonic_acid; xylonic	
CHEMICALS	aconitic_acid	aconitic_acid	
CHEMICALS	adipic_acid	adipic_acid; bio_adipic_acid_production	
CHEMICALS	ascorbic_acid	ascorbic_acid; (ascorbic_acid; ascorbic_acid_content	
CHEMICALS	citric_acid	citric_acid; (citric_acid; citric_acid_solutions; citric_acid_solution; citric_acid_concentration; g/l_citric_acid; malic_and_citric_acids; citric_acid_productivity; m_citric_acid; citric_acid_fermentation; citric_and_malic_acids; citric_acid_monohydrate; citric_acid_factory	
CHEMICALS	fructose	fructose; fructose_concentration; %_fructose_conversion; only_fructose	
CHEMICALS	2,5_furan_dicarboxylic_acid	2,5_furan_dicarboxylic_acid	
CHEMICALS	glucaric_acid	glucaric; glucaric_acid	
CHEMICALS	gluconic_acid	gluconic_acid	
CHEMICALS	kojic_acid	kojic_acid	
CHEMICALS	coumaric_acid	coumaric_acid; coumaric; coumaric_acid	
CHEMICALS	sorbitol	sorbitol	
CHEMICALS	aconic_acid	aconic_acid	
CHEMICALS	btx	btx; btx_aromatics	
CHEMICALS	btex	btex; btex_concentration; btexs	
CHEMICALS	toluene	toluene; -toluene; (toluene; toluene_solution; toluene_solvent; toluene_formation; toluene_solutions	
CHEMICALS	xylene	xylene; xylenes_(btex; p_xylenes; o_xylene; xylene_(btex	
CHEMICALS	benzen	benzen; benzene.; benzene_compounds	
CHEMICALS	cyclohexane	cyclohexane; cyclohexane_ring; higher_cyclohexane_conversion	
CHEMICALS	styrenes	styrenes; p_substituted_styrenes; styrene_monomer; styrene_conversion	
CHEMICALS	biphenyls	biphenyls	
CHEMICALS	phenol	phenol; high_phenol_concentration; phenol_compounds; aqueous_phenol_solutions; phenol_production; higher_phenol_concentrations; aqueous_phenol_solution	

CHEMICALS	substituted_phenols	substituted_phenols; nitro_substituted_phenols; para_substituted_phenols; methoxy_substituted_phenols; various_phenols	
CHEMICALS	catechols	catechols; catecholate	
CHEMICALS	cresols	cresols; p_cresols	
CHEMICALS	resorcinols	resorcinols; -methylresorcinol; resorcinol_formaldehyde; model_compound_resorcinol	
CHEMICALS	eugenol	eugenol; isoeugenol	
CHEMICALS	syringols	syringols; syringyl_phenols	
CHEMICALS	coniferols	coniferols	
CHEMICALS	guaiacols	guaiacols; guaiacol_derivatives	
CHEMICALS	vanillin	vanillin; natural_vanillin; vanillin_concentration; 13c_vanillin; vanillyl; vanillin_production	
CHEMICALS	vanillic_acid	vanillic_acid; vanillic	
CHEMICALS	dmsol	dmsol; dmsol_solvent; %_dimethylsulfoxide; dimethyl_sulfoxide@€"ionic_liquid_mixtures; dimethyl_sulfate; dimethylsulfone	
CHEMICALS	aromatic_acids	aromatic_acids; aromatic_organic_acids; aromatic_and_aliphatic_(short_chain_carboxylic_acids; major_aromatic_compounds; aromatic_organic_compounds	
CHEMICALS	aliphatic_acids	aliphatic_acids; aliphatic_short_chain_carboxylic_acids; aromatic_and_aliphatic_(short_chain_carboxylic_acids; short_chain_aliphatic_carboxylic_acids	
CHEMICALS	syringaldehyde	syringaldehyde; syringaldazine; acetosyringone	
CHEMICALS	aldehydes	aldehydes; aldehydes/ketones; aliphatic_aldehydes; different_aldehydes; aliphatic_and_aromatic_aldehydes; linear_aldehydes; unsaturated_aldehydes	
CHEMICALS	quinones	quinones; semiquinones; benzoquinones; hydroquinones; quinone_groups; semiquinone_type_radicals; quinone_intermediates; naphthoquinones; corresponding_quinones; quinonic_compounds; quinone	
CHEMICALS	cyclohexanol/_cyclohexanal	cyclohexanol; cyclohexanone_conversion; cyclohexanone_selectivity; cyclohexane_conversion; cyclohexanal; cyclohexane_conversion; cyclohexanone_selectivity	
CHEMICALS	beta_keto_adipate	beta_keto_adipate; l^2_ketoadipate_pathway	
CHEMICALS	substituted_lignins	substituted_lignins; isolated_lignins; extracted_lignins; wood_lignins; treated_lignin; milled_wood_lignins; obtained_lignins; kraft_lignins; organosolv_lignins; wood_lignin; different_lignins	
CHEMICALS	triglyceride	triglyceride; triglyceride_transesterification; triglyceride_conversion	
CHEMICALS	fatty_acids	fatty_acids; fatty_acid_triglycerides; fatty_acid_esterification; several_fatty_acids; esterified_fatty_acids; various_fatty_acids; bacterial_fatty_acids; mainly_fatty_acids; total_fatty_acids; monounsaturated_fatty_acid; polyunsaturated_fatty_acids; predominant_fatty_acids; c16_fatty_acids; essential_fatty_acids; c18_fatty_acids	
CHEMICALS	1,3-propanediol	1,3-propanediol	
CHEMICALS	propylene_glycol	propylene_glycol	
CHEMICALS	epichlorohydrin	epichlorohydrin	
CHEMICALS	dihydroxyacetone	dihydroxyacetone; -dihydroxyacetone	
CHEMICALS	quinolines	quinolines; quinoline_derivatives; isoquinolines; tetrahydroquinolines; tetrahydroquinoline; -tetrahydroquinoline; polyquinoline	
CHEMICALS	acrolein	acrolein; acrolein_yield; renewable_acrolein_production	
CHEMICALS	acrylic_acid	acrylic_acid; poly_acrylic_acid; cyanoacrylic_acid; poly(acrylic_acid	
CHEMICALS	glycerol_carbonate	glycerol_carbonate; glycerol_carbonate_synthesis	
CHEMICALS	solketal	solketal; solketal_yield; glycerol_acetalization	
CHEMICALS	nitroglycerine	nitroglycerine	
CHEMICALS	alanine	alanine; (alanine; l^2_alanine	
CHEMICALS	arginine	arginine	
CHEMICALS	aspartate	aspartate; l_aspartate; asparagine	
CHEMICALS	cysteine	cysteine; cystein; amino_acid_cysteine	
CHEMICALS	glutamine	glutamine	
CHEMICALS	histidine	histidine	
CHEMICALS	hydroxyproline	hydroxyproline	
CHEMICALS	isoleucine	isoleucine	
CHEMICALS	leucine	leucine	
CHEMICALS	lysine	lysine	
CHEMICALS	phenylalanine	phenylalanine	
CHEMICALS	proline	proline; proline_content; proline_derivatives; proline_concentrations; free_proline	
CHEMICALS	serine	serine	
CHEMICALS	tryptophan	tryptophan; tryptophan_like_substances; tryptophan_like_component; tyrosine_like_proteins	
CHEMICALS	threonine	threonine	
CHEMICALS	valine	valine	
CHEMICALS	glycine	glycine	
CHEMICALS	methionine	methionine; dl_methionine	
CHEMICALS	tyrosine	tyrosine; tyrosine_like_proteins	
CHEMICALS	methyl_esters	methyl_esters; methyl_ester; their_methyl_esters; their_methyl_ester; methyl_ester_production; oil_methyl_esters; fatty_acids_methyl_esters; oleic_acid_methyl_ester; methyl_ester_content; methyl_ester_conversion; lauric_acid_methyl_ester; acid_methyl_ester; fatty_acid_methyl_ester; rapeseed_oil_methyl_esters	
CHEMICALS	formaldehyde	formaldehyde; gaseous_formaldehyde; formaldehyde_gas; formaldehyde_formation; formaldehyde_conversion; formaldehyde_generation	
CHEMICALS	dimethylcarbonate	dimethylcarbonate; dimethyl_carbonate	
CHEMICALS	mtbe	mtbe; methyl_tert_butyl_ether; methyl_tertiary_butyl_ether; (mtbe; methyl_t_butyl_ether	
CHEMICALS	olefin	olefin; olefins; lower_olefin; olefin_conversion; olefin_formation; other_olefins; corresponding_olefins; lower_olefins; olefines; higher_olefins; it_olefins; olefin_production	
CHEMICALS	isobutene	isobutene; isobutene_yield; isobutene_selectivity; iso_butene	
CHEMICALS	α-olefins	α-olefins; alpha_olefins	
CHEMICALS	wax	wax; waxes; natural_waxes; synthetic_waxes; epicuticular_waxes; normal_paraffins; paraffinic_hydrocarbons	
CHEMICALS	1,3-PDO	1,3-PDO	
CHEMICALS	propylalcohol	propylalcohol	
CHEMICALS	epoxides	epoxides; epoxide; corresponding_epoxides; epoxidation; various_epoxides; other_epoxides; mono_epoxide; corresponding_epoxide; epoxide_product; epoxidation_process	
CHEMICALS	acrylates	acrylates; acrylate; acrylated; acrylate_groups; ethyl_acrylate; butyl_acrylate; diacrylate; methyl_acrylate	
CHEMICALS	l-propylene_glycol	l-propylene_glycol; propylene_glycol; bio_propylene_glycol; polyethylene_glycol_(peg	
CHEMICALS	lactide	lactide; lactides; l_lactide; rac_lactide; poly(lactide; polylactides; d_lactide; polylactide; poly_lactide; poly(lactide_co_glycolide)_(plga); poly(l_lactide; poly_l_lactide; poly(l_lactic_acid; polyglycolide	
CHEMICALS	acrylamides	acrylamides; acrylamide	
CHEMICALS	propionol	propionol	
CHEMICALS	2-amino-1,3-PDO	2-amino-1,3-PDO	
CHEMICALS	2-aminomalonic	2-aminomalonic	
CHEMICALS	amino-3HP	amino-3HP	

CHEMICALS	thf	thf; tetrahydrofuran; tetrahydrofurane; tetrahydrofurans; thf_solvent; thf_solution; thf_solubles	
CHEMICALS	γ-butyrolactone	γ-butyrolactone; γ-butyrolactone; butyrolactone; γ-butyrolactone; γ-butyrolactone	
CHEMICALS	pyrrolidones	pyrrolidones; pyrrolidone; -pyrrolidone; pyrrolidinone	
CHEMICALS	4,4-bionelle	4,4-bionelle	
CHEMICALS	hydroxybutyric acid	hydroxybutyric acid; hydroxybutyric acid; -hydroxybutyric	
CHEMICALS	hydroxybutyrolactone	hydroxybutyrolactone	
CHEMICALS	hydroxybutyrate	hydroxybutyrate; hydroxybutyrate; -hydroxybutyrate	
CHEMICALS	epoxy-γ-butyrolactone	epoxy-γ-butyrolactone	
CHEMICALS	butenoic acid	butenoic acid	
CHEMICALS	butanediols	butanediols; butanediol; -butanediol	
CHEMICALS	butenols	butenols	
CHEMICALS	δ-aminolevulinate	δ-aminolevulinate	
CHEMICALS	2-methyl thf	2-methyl thf; methyl tetrahydrofuran	
CHEMICALS	1,4-diols	1,4-diols	
CHEMICALS	succinate	succinate; succinate_production; succinate_recovery; final_succinate_concentration; succinate_biosynthesis; bio_based_succinate; high_succinate_yield; bio_based_succinate_production	
CHEMICALS	glycerol	glycerol; bio_glycerol_conversion; glycerol_concentrations; %_glycerol_conversion; glycerol_fraction; high_glycerol_conversion; crude_glycerol_combustion; biomass_glycerol; glycerol_combustion; only_glycerol; glycerol_aqueous_solution; glycerol_concentrations; residual_glycerol; crude_glycerol_addition; technical_glycerol; cinnamoyl_glycerol; biomass_glycerol; refined_glycerol	
CHEMICALS	lactate	lactate; lactate_concentration; lactate_production; lactate_accumulation; lactate_fermentation; only_lactate	
CHEMICALS	hydroxy furans	hydroxy_furans; hydroxy_methyl_furfural	
CHEMICALS	1,5-pentanediol	1,5-pentanediol	
CHEMICALS	caprolactam	caprolactam; ε-caprolactam; η-caprolactam; caprolactam_selectivity	
CHEMICALS	1,5-diaminopentane	1,5-diaminopentane	
CHEMICALS	gluconolactones	gluconolactones	
CHEMICALS	monolactones	monolactones	
CHEMICALS	isoboride	isoboride; isoboride_production; isoboride_conversion; isoboride_yield; %_isoboride_selectivity	
CHEMICALS	fuel oxygenate	fuel_oxygenate; fuel_oxygenates; oxygenated_fuels; oxygenated_fuel_additives	
CHEMICALS	antifreeze and deicers	antifreeze_and_deicers; antifreeze; deicer	
CHEMICALS	green solvents	green_solvents; green_solvent; new_green_solvents; two_green_solvents; green_solvent_system; potential_green_solvents; alternative_solvents; conventional_solvents; conventional_organic_solvents; environmentally_benign_solvents; renewable_solvents; traditional_solvents; traditional_organic_solvents; solvents; selective_solvents	
CHEMICALS	bio emulsifiers	bio_emulsifiers; bio_emulsifier; emulsifiers; different_emulsifiers; emulsifier; emulsifier_production; emulsifying_agents; bioemulsifiers	
CHEMICALS	chelating agents	chelating_agents; chelating_agent; various_chelating_agents; organic_chelating_agents; different_chelating_agents	
CHEMICALS	plasticizers	plasticizers; plasticizer; phthalate_plasticizers; plasticisers; bio_based_plasticizers; green_plasticizer; bio_plasticizer; plasticiser; bio_based_plasticizer	
CHEMICALS	bio surfactant	bio_surfactant; bio_surfactants; two_surfactants; chemical_surfactants; surfactant; other_surfactants; surfactant_production; synthetic_surfactants; surfactant; natural_surfactants; biodegradable_surfactants; mixed_surfactants; organic_surfactant; surfactant_present; different_surfactants; surfactant_type; organic_surfactants; surfactants	
CHEMICALS	pharmaceutical	pharmaceutical; pharmaceutical_industries; pharmaceutical_processing; pharmaceutical_products; pharmaceutical_application; pharmaceutical_uses; pharmaceutical_research; pharmaceutical_production; pharmaceutical_materials; pharmaceutical_interest; pharmaceutical_product; pharmaceutical_processes; pharmaceutical_industry; pharmaceutical_applications; pharmaceuticals; pharmaceutical_and_chemical_industries; pharmaceutical_chemistry; pharmaceutical_manufacturing; pharmaceutical_sector; medical; medicine; medical_sciences; medical_science; medical_technology; clinical_medicine; hospital; clinical; biomedical; biomedical_sciences; transfusion_medicine; new_medical_devices; biomedical_engineering; medical_products; bio_medical_engineering; pediatrics; medical_application; biomedical_materials; medical_treatment; biomedical_research; conventional_medicine; traditional_medicine; personalized_medicine; modern_medicine; medicines; pharmacology; biological_medicines; biomedicine; veterinary_medicine; pharmacy; chinese_medicine	
CHEMICALS	cosmetic	cosmetics; cosmetic_industry; cosmetic_products; cosmetic_applications; cosmetic_and_pharmaceutical_industries; pharmaceutical_and_cosmetic_industries; cosmetic_formulations; cosmetics_industry; cosmetics_products; cosmetics_and_pharmaceutical_industries; food_and_cosmetic_industries; natural_cosmetics; cosmetic_ingredients; cosmetology; modern_cosmetics	
MATERIALS			[1,4,7,8]
MATERIALS	polyethylene (PE)	polyethylene; polyethylenes; low_density_polyethylene; low_density_polyethylene; high_density_polyethylene; hdpe_high_density_polyethylene; linear_low_density_polyethylene; expanded_polyethylene; linear_polyethylene; co_pyrolysis_of_low_density_polyethylene; recycled_polyethylene; ldpe; hdpe; cross_linked_polyethylene; PE_plastic; high_density_polyethylene_geomembrane	
MATERIALS	polymethylmethacrylate (PMMA)	polymethylmethacrylate; polymethacrylate; polymethyl_methacrylate; polymethacrylates; poly(methyl_methacrylate; pmma; pmma_plastic; (pmma; pmma_matrix; pmma_films	
MATERIALS	polyamide (PA)	polyamide; polyamides; polyamide_membrane; bio_based_polyamide; polyamidoamine; PA_plastic; PA_nylon	
MATERIALS	polystyrene (PS)	polystyrene; polystyrenes; expanded_polystyrene; sulfonated_polystyrene; petrol_based_polystyrene; extruded_polystyrene; high_impact_polystyrene; polystyrene_resins; chloromethylated_polystyrene; polystyrene_networks; tissue_culture_polystyrene; polystyrene_sulfonate; expanded_polyethylene; recycled_high_impact_polystyrene; polystyrene_beads; ps; (ps; ps_plastic; ps_production	
MATERIALS	polyurethane (PU/PUR)	polyurethane; polyurethane_foam; polyurethanes; polyurethane_foams; biopolyurethane; flexible_polyurethane_foam; polyurethane_resin; polyurethane_coating; polyurethane_sheets; flexible_polyurethane_foams; polyurethane_coatings; polyurethane_synthesis; rigid_polyurethane_foams; polyurethane_wood_adhesives; polyurethane_elastomer; thermoplastic_polyurethanes; biodegradable_polyurethane; hydrophilic_polyurethane; polyurethane_chemistry; polyurethane_sheets; PU_plastic; PUR_plastic	
MATERIALS	polyvinylchloride (PVC)	polyvinylchloride; polyvinyl_chloride; pvc; polyvinyl; poly(vinyl_chloride; PVC_plastic; (vinyl_chloride; poly_vinyl_chloride; plasticized_poly(vinyl_chloride; rigid_poly(vinyl_chloride; pvc_materials; chlorinated_polymers; pure_pvc; plasticized_poly(vinyl_chloride; polyvinyl; (pvc; pvc_products	
MATERIALS	polyethylene terephthalate (PET)	polyethylene_terephthalate; polyethylene_terephthalate; pet_(polyethylene_terephthalate; flexible_polyethylene_terephthalate; polyethylene_terephthalate; polyethyleneterephthalate; pet; pet_plastic; pet_(polyethylene_terephthalate; poly(ethylene_terephthalate; pet_bottles; pet_like_plastic	
MATERIALS	polyethylether ketone (PEEK)	polyethylether_ketone; polyetheretherketone; PEEK; PEEK_plastic	
MATERIALS	epoxies (EP)	epoxies; epoxy_resins; epoxy; bio_based_epoxy_resins; epoxy_resin	

MATERIALS	elastomers_such_as_natural_rubber_(NR)	elastomer; elastomer_composites; biodegradable_polyester_elastomers; bio_elastomers; polyurethane_elastomer; bioelastomer; biodegradable_elastomers; natural_rubber_latex; rubber; rubber_products; rubber_polymer; rubber_production; tire_rubber; rubber_industry; rubbers; ground_tire_rubber	
MATERIALS	polybutylene_adipate_terephthalat_(PBAT)	polybutylene_adipate_terephthalat; poly(butylene_adipate_co_terephthalate)_ (pbat; adipate_co_terephthalate)_ (pbat; PBAT; PBAT_plastic	
MATERIALS	polybutylene_succinate_(PBS)	polybutylene_succinate; butylene_succinate; poly(butylene_succinate; polybutylene; poly_(butylene_succinate; biodegradable_poly(butylene_succinate; PBS; PBS_plastic	
MATERIALS	polyhydroxy_alkanoate_(PHA)	polyhydroxy_alkanoate; polyhydroxyalkanoate; polyhydroxyalkanoates; polyhydroxyalkanoates; polyhydroxyalkanoates_production; polyhydroxyalkanoate_synthesis; polyhydroxyalkanoate_production; medium_chain_length_polyhydroxyalkanoates; polyhydroxyalkanoates; mixed_culture_polyhydroxyalkanoate_production; pha_production; pha_productivity; hydroxyalkanoate; pha_production_process; pha_producers; pha_contents; pha_production_capacity; hydroxyalkanoates; pha_content; pha_synthesis; pha_accumulation; high_pha_content; pha_composition; polyhydroxyalkanoates; Pha_plastic; pha	
MATERIALS	polylactic_acid_(PLA)	polylactic_acid; polylactic; biodegradable_polylactic_acid; poly(lactic_acid; pla; biodegradable_poly(lactic_acid; poly_lactic_acid; polylactide_polymers; poly_lactic_acid; (lactic_acid; poly(l_lactic_acid; (l_lactic_acid; poly_l_lactic_acid; lactic_acid_monomer; polylactide; polylactides; pla_composites; pla_products; neat_pla; poly(lactic; pla_blends; poly(lactide; pla_matrix; pure_pla; pla_properties; pla_processing; pla_based_materials	
MATERIALS	polypropylene_(PP)	polypropylene; porous_polypropylene; polypropylene_(pp; recycled_polyethylene; polypropylene_composites; polypropylene_matrix; linear_polyethylene; polypropylene_addition; PP_plastic	
MATERIALS	starch_blends	starch_blends; starch_blend; starch_based_plastics; starch_based_polymers; starch_based_polymer; starch_based_thermoplastics; starch_based_films; starch_based_materials; starch_based_products; corn_starch_based_films; starch_based_foams; biodegradable_thermoplastic_starch; starch_based_trays; starch_based_biomaterials; starch_polymers	
MATERIALS	polycarbonates_(PC)	polycarbonates; polycarbonate; aliphatic_polycarbonates; aliphatic_polycarbonate	
MATERIALS	polytrimethylene_terephthalate_(PTT)	polytrimethylene_terephthalate; ptt; poly(trimethylene	
MATERIALS	styrene-butadiene_rubber_(SBR)	styrene_butadiene_rubber; sbr	
MATERIALS	polybutylene_terephthalate_(PBT)	polybutylene_terephthalate; poly(butylene_terephthalate; pbt	
MATERIALS	furan-based_polymers	furan-based_polymers	
MATERIALS	polyesters	polyesters; biodegradable_polyesters; aliphatic_polyesters; other_polyesters; degradable_polyesters; aromatic_polyesters; unsaturated_polyesters; bio_based_polyesters; polyester; novel_polyesters; biodegradable_polyester; polyester_synthesis; biodegradable_thermoplastic_polyester; aliphatic_polyester	
MATERIALS	polyterpene_resins	polystyrene_resins	
MATERIALS	terpene-based_polymers	terpene-based_polymers	
MATERIALS	polyethylene_furanoate_(PEF)	polyethylene_furanoate; PEF_plastic	
MATERIALS	superabsorbent_polymers	superabsorbent_polymers	
MATERIALS	cellulose-based_polymers	cellulose-based_polymers; cellulose_polymers	
MATERIALS	starch-based_polymers	starch-based_polymers; starch_based_polymers; starch_based_polymer	
MATERIALS	lignin-based_polymers	lignin-based_polymers	
MATERIALS	cellulose_acetate_(CA)	cellulose_acetate; cellulose_acetates	
MATERIALS	polyolefins	polyolefins; polyolefin	
MATERIALS	rosin	rosin	
MATERIALS	composites	composite; composites; natural_fiber_reinforced_composites; fiber_reinforced_composite_materials; natural_fiber_polymer_composites; reinforced_epoxy_composites; reinforced_polymer_composites; reinforced_composites; natural_fibre_composites; composites; green_composite; hybrid_composite; other_composite_materials	
MATERIALS	carbon_fiber	carbon_fiber; carbon_fibres; carbon_fiber_textiles	
MATERIALS	natural_fiber_/plant_fiber	plant_fiber; plant_fibers; plant_fibres; natural_fiber; bamboo_fiber; cellulose_fiber; natural_cellulose_fiber; cellulosic_fiber; natural_cellulose_fibers; cellulose_fibers; wood_fibers; wood_fiber; lignocellulosic_fiber; natural_fibers; natural_fibre; agricultural_fibers; a_natural_fibers; natural_fibres; sisal_fiber; lignocellulosic_fibers; kenaf_fiber	
MATERIALS	wood-based_boards	wood-based_boards; wood_based_panels; wood_panels; particleboard_production; wood_particleboard; wood_based_panel; fiberboards; particleboards; cement_bonded_particleboards; fibreboards; particleboard; wood_based_products; particleboard_manufacture	
MATERIALS	biobased_paint	biobased_paint; paint; paints	
MATERIALS	bioadhesive	bioadhesive; bioadhesives; bio_adhesive; adhesive	
MATERIALS	biofilter	biofilter; biofilters; biofilter_unit; biofilter_material; biofilter_media; biofiltration_system; compost_biofilter; organic_biofilter; two_biofilters; biofiltration; biofiltration_column; pilot_scale_biofilter; all_the_biofilters; biofiltration_columns; water_biofiltration; biofiltration_processes	
MATERIALS	microbial_media	microbial_growth_media; microbial_substrates; microbial_substrate; microbial_cultivation; growing_substrate; growing_medium	
MATERIALS	greenhouse_substrate	greenhouse_substrate; plant_growth_medium; soilless_substrates	
MATERIALS	bio-absorbent	bio-absorbent; absorbent; absorbents; bioabsorbent; renewable_absorbent; adsorption_material; adsorbent; potential_adsorbent; efficient_adsorption_material; alternative_adsorbent; adsorbent_material; good_adsorbent; adsorption_materials; efficient_adsorbent	
MATERIALS	bio-desiccant	bio-desiccant	
MATERIALS	bedding_material	bedding_material; animal_bedding; sawdust_bedding; straw_bedding; sheep_bedding; bedding_materials; bedding; farm_bedding	
MATERIALS	fertilizer	fertilizer; potential_fertilizer; valuable_fertilizer; commercial_fertilizers; other_fertilizers; waste_compost; organic_waste_compost	
MATERIALS	compost	compost; composting; organic_waste_composts; waste_compost; organic_waste_compost	
MATERIALS	soil_improver	soil_improver; soil_improvers; top_soil_improvers; soil_improvements; beneficial_soil_amendment; valuable_soil_amendment; common_soil_amendment; agricultural_soil_amendments; good_soil_amendment; soil_conditioner; soil_amendment; soil_improvement; soil_amender; biochar_soil_amendment; soil_amenders; pathogen_free_soil_amendments; soil_improver; organic_waste_soil_improvers; waste_soil_improver; organic_waste_soil_improver	
ENERGY; CHEMICALS & ENERGY			[9-15]
ENERGY	dedicated_combustion_/incineration	dedicated_combustion; combustion; firing; co-combustion; incineration; co-firing; proper_combustion; combustion_purposes; different_combustion_processes; high_temperature_combustion_processes; (l_combustion; advanced_combustion; co_firing_technology; co_firing_plants; co_firing_potential; co_firing_case; co_firing_power_generation; co_firing_applications; coal/biomass_combustion; lignite_combustion; soot_combustion; thermal_power_stations; incineration_methods; incineration_technologies; incinerate; incineration_facilities; mass_burn_incineration	

ENERGY	briquette/_pellet_fuel	briquette; pellet_fuel; pellet; briquetted; densification; pelletization; (briquettes; briquette_fuel; briquette_production; bio_briquettes; briquette_producers; biomass_briquette_fuel; biomass_briquetting; fuel_pellet_production; pellet_combustion; fuel_pellets_production; pellet_producers; pelletizing_process; biofuel_pellets; densified_fuel; pellet_plants; large_scale_pellet_production; biomass_pellet; fuel_pellet; pelletized; fuel_pellet_production; densification_processes; densification_technologies; pelletization_process; co_pelletization; produced_pellets; pelletizing_properties; biomass_densification; densified_biomass; pelletised; pelletized_biomass; pelleting_process	
ENERGY	torrefaction	torrefaction; torrefied_biomass; torrefied_biomass_samples; torrefied_biomass_pellets; torrefied_mä; torrefied_gc; torrefied_sample; torrefied_wood; torrefied_pks; torrefaction_processes; torrefaction_treatment; torrefaction_technology; biomass_torrefaction_process; torrefied; torrefaction_plant	
ENERGY	biodiesel	biodiesel; renewable_biodiesel_production; integrated_biodiesel_production; enhanced_biodiesel_production; further_biodiesel_production; potential_biodiesel_production; (biodiesel; karanja_biodiesel_production; biodiesel_producer; commercial_biodiesel; biodiesel_fuel_production; derived_biodiesel; fame_diesel; oleic_acid_methyl_ester; oil_methyl_esters; obtained_biodiesels; fatty_acid_methyl_ester; biodieselâ€ diesel_blends; three_biodiesels; pure_biodiesel; fatty_acid_methyl_ester_(fame; biodiesel_blend; neat_biodiesel; faee_diesel; reference_diesel; abe_diesel_blends; real_diesel; pure_diesel; diesel_fuel; renewable_diesel_fuels; synthetic_diesel; fischer_tropsch_diesel; ft_diesel; diesel_fuel_production; fischer_tropsch_fuels; renewable_diesel_fuels; syndiesel; synthetic_diesel; fischer-tropsch_biodiesel; fischerâ€ tropsch_fuels; fischer_tropsch_fuels; fischer_tropsch_(ft; ft_biodiesel; ft_biofuels; neat_biodiesel; product_biodiesel; e.g._biodiesel; biodiesel_scenario; resultant_biodiesel; pure_biodiesel; first_generation_biodiesel; resulting_biodiesel; obtained_biodiesel; renewable_diesel; renewable_diesel_fuels; renewable_diesel_production; renewable_jet_fuel_process; diesel_fuel_production; green_diesel_fractions; renewable_biodiesel_production; green_diesel; green_diesel_fractions; renewable_diesel_fuels; renewable_diesel_production; diesel_fuel_range; diesel_fuel_production; synthetic_diesel; diesel_fuels; hhdr; diesel_product; green_diesel_fractions; htu_diesel; renewable_diesel_fuels; alternative_diesel_fuel	[13,16-18]
ENERGY	bio_jet_fuel	bio_jet_fuel; alcohol-to-jet; oil-to-jet; hefa-sp; sugar-to-jet; gas-to-jet; ft-sp; ft-ska; bio_aviation_fuel; synthetic_jet_fuel; synthetic_aviation_fuel; bio_kerosene; bio_jet_fuel_production; bio_jet_fuel_yield; renewable_jet_fuel_process; alternative_jet_fuels; hydrotreated_renewable_jet_fuel; jet_fuel_production; jp_jet_fuel; biojet_fuel_production; biomass_derived_jet_fuel; biojet_fuel; alternative_jet_fuels; renewable_jet_fuel_process; biomass_derived_jet_fuel; hydrotreated_renewable_jet_fuel; biofuelsâ€ aviation_biofuels; jet_fuel_production; bio_jet_fuel_production; hefa; bio_aviation_fuels; renewable_aviation_fuel; aviation_fuels; alternative_aviation_fuels; bio_based_aviation_fuels; aviation_biofuels; renewable_jet_fuel_process; jet_fuel_production; alternative_jet_fuels; biomass_derived_jet_fuel; renewable_jet_fuel_process; bio_jet_fuel_production; jp_jet_fuel; hydrotreated_renewable_jet_fuel; aviation_fuel; traditional_jet_fuels; aviation_fuels; renewable_aviation_fuel; bio_based_aviation_fuels; aviation_fuels; alternative_aviation_fuels; bio_aviation_fuels; bio_aviation_fuel; aviation_bio_kerosene; paraffinic_kerosene; %_kerosene; synthetic_paraffinic_kerosene; biokerosene; pure_kerosene; aviation_biofuels; aviation_fuels	[19-23]
ENERGY	waste_vegetable_oil_fuel	waste_vegetable_oil_fuel	
ENERGY	biogasoline	gasoline; e.g._gasoline; bio_gasoline; renewable_gasoline; green_gasoline; gasoline_production; bio_gasoline_production; %_gasoline; synthetic_gasoline; commercial_gasoline; biorenewable_gasoline; gasoline_products; aviation_gasoline; pure_gasoline	
CHEMICALS_&_ENERGY	syngas	syngas; syngas_product; syngas_components; syngas_mixture; obtained_syngas; syngas_mixtures; clean_syngas_production; (syngas; synthesis_gases; syngas_combustion; enhanced_syngas_production; generated_syngas; synthetic_gas; synthetic_gasification_gas; bio_synthetic_gas; synthetic_gas_(syngas; synthetic_gas_mixtures; raw_synthesis_gas; clean_synthesis_gas; synthetic_gasified_biomass; produced_synthesis_gas; synthetic_fuel_gas; rich_synthesis_gas; high_quality_synthesis_gas; clean_hydrogen_rich_synthesis_gas	
CHEMICALS_&_ENERGY	biohydrogen	biohydrogen; biohydrogen_production_processes; biohydrogen_gas; dark_fermentative_biohydrogen_production; biohydrogen_production_systems; biohydrogen_production_pathways; biohydrogen_production_technologies; lignocellulosic_biohydrogen_production; fermentative_biohydrogen; biohydrogen_yields; chapter_biohydrogen_production; fermentative_hydrogen_production_process; dark_fermentation; dark_fermentations; (dark_fermentation; dark_fermentation_processes; dark_fermentation_system; dark_fermentation_hydrogen_production; dark_fermentative_bio_hydrogen_production; dark_fermentation_technology; hydrogen_dark_fermentation; dark_fermentative_biohydrogen_production; batch_dark_fermentation; sequential_dark_fermentation; anaerobic_dark_fermentation; photobiological_hydrogen; photobiological_hydrogen_production; microbiological_hydrogen_production; photoelectrochemical_hydrogen_production; continuous_photo_fermentative_hydrogen_production; hydrogen_photoproduction; biochemical_hydrogen_potential; microbial_hydrogen_production; hydrogen_dark_fermentation; biological_h2_production; photosynthesis_hydrogen; bacterial_photosynthesis; photoautotrophic_hydrogen; photoheterotrophic_hydrogen; photobiological_hydrogen_production; photosynthetic_bacterium_rhodobacter_sphaeroides; sequential_dark_and_photo_fermentation_process; photo_fermentative_h2_production; dark_fermentation_hydrogen_production; dark_and_photo_fermentation_processes	
CHEMICALS_&_ENERGY	pyrolysis_oil	pyrolysis_oil_products; upgraded_pyrolysis_oil; produced_pyrolysis_oil; crude_pyrolysis_oil; co_pyrolysis_oil; upgraded_pyrolysis_oils; raw_pyrolysis_oil; flash_pyrolysis_oil; pyrolysis_oil_production; produced_pyrolysis_oils; pyrolysis_oil_combustion; fast_pyrolysis_oil_(po; biocrude; bio-oil; ht_l_biocrude; hydrothermal_liquefaction_biocrude; biocrude_oil_yield; biocrude_upgrading; biocrude_quantity; biocrude_oil_production; total_biocrude_yield; two_biocrudes; maximum_biocrude_oil_yield; hydrothermal_liquefaction	[24,25]
CHEMICALS_&_ENERGY	ethanol/_bioethanol	ethanol, bioethanol, combined_ethanol; either_ethanol; subsequent_ethanol_production; ethanol_producer; commercial_ethanol; ethanol_processing; >ethanol; w/w)_ethanol; higher_ethanol_conversion; based_ethanol_production; first_generation_bioethanol_production; industrial_bioethanol_production; bioethanol_fuel; sustainable_bioethanol_production; advanced_bioethanol_production; integrated_bioethanol_production; bioethanol_processing; bioethanol_production_processes; second_generation_bioethanol_production_plant; first_and_second_generation_bioethanol_production; first_and_second_generation_bioethanol; produced_bioethanol; bioethanol_conversion	[26,27]
CHEMICALS_&_ENERGY	methanol	methanol	[28,29]
CHEMICALS_&_ENERGY	butanol	butanol; acetoneâ€ butanol; (n_butanol; acetone_n_butanol_ethanol; butanol_conversion; acetone_butanol_ethanol_mixture; butanol; isopropanol_n_butanol_ethanol; n_butanol_conversion; l_butanol; acetoneâ€ butanol_fermentation; butanol_concentration	
CHEMICALS_&_ENERGY	dimethylfuran	dimethylfuran	
CHEMICALS_&_ENERGY	dimethylether_(DME)	dimethylether; dimethylether_(dme; dimethyl_ether; dimethyl_ether_production; di_methyl_ether; dimethyl_ether_synthesis; dme; bio_dimethyl_ether; bio-dme; bio_dimethyl_ether; single_step_dimethyl_ether_synthesis; dme_production; direct_dme_synthesis; dme_synthesis; dme_production; dme_yield	[29-32]
CHEMICALS_&_ENERGY	bioethers	bioethers	

## References

1. Davis, C.B.; Aid, G.; Zhu, B. Secondary Resources in the Bio-Based Economy: A Computer Assisted Survey of Value Pathways in Academic Literature. *Waste and Biomass Valorization*
2. Vlaamse, K.; Van Belgie, A. *Industrial Biomass: Source of Chemicals, Materials, and Energy* ; 2010;
3. Werpy, T.; Petersen, G. Top Value Added Chemicals from Biomass: Volume I -- Results of Screening for Potential Candidates from Sugars and Synthesis Gas. Office of Scientific and Technical Information (OSTI). *Off. Sci. Tech. Inf.* **2004**, 69, doi:10.2172/15008859.
4. Clark, J.; Deswarte, F. *Introduction to Chemicals from Biomass* ; Clark, J., Deswarte, F., Eds.; Wiley, 2015; Vol. 9781118714485; ISBN 9781118714485.
5. Holladay, J.E.; Bozell, J.J.; White, J.F.; Johnson, D. *Top Value-Added Chemicals from Biomass - Volume II—Results of Screening for Potential Candidates from Biorefinery Lignin* ; 2007;
6. van Ree, R.; de Jong, E.; Kwant, K. *Task 42 - Biobased Chemicals value added products from biorefineries* ; 2012;
7. Ashby, M.F.; Jones, D.R.H. (David R.H. *Engineering materials 1 : an introduction to properties, applications and design* ; Elsevier Butterworth-Heinemann, 2005; ISBN 9780080468624.
8. Mirabal, A.S.; Scholz, L.; Carus, M. *Market study on Bio-based Polymers in the World Capacities, Production and Applications: Status Quo and Trends towards 2020* ; 2013;
9. Biofuel Biofuels - Types of Biofuels Available online: <http://biofuel.org.uk/types-of-biofuels.html> (accessed on Apr 18, 2020).
10. Physics Energy – The Physics Hypertextbook Available online: <https://physics.info/energy/> (accessed on Apr 18, 2020).
11. Ho, D.P.; Ngo, H.H.; Guo, W. A mini review on renewable sources for biofuel. *Bioresour. Technol.* **2014**, *169*, 742–749.
12. Mustafa, N. What are the differences between (bio-jet, bio-ethanol and bio-diesel)? Available online: [https://www.researchgate.net/post/What\\_are\\_the\\_differences\\_between\\_bio-jet\\_bio-ethanol\\_and\\_bio-diesel](https://www.researchgate.net/post/What_are_the_differences_between_bio-jet_bio-ethanol_and_bio-diesel) (accessed on Apr 18, 2020).
13. Bauen, Ausilio; Berndes, Göran; Junginger, Martin; Londo, Marc; Vuille, F. *KEY MESSAGES BIOENERGY-A SUSTAINABLE AND RELIABLE ENERGY SOURCE A review of status and prospects* ; 2009;
14. Basu, P. *Biomass Gasification, Pyrolysis and Torrefaction: Practical Design and Theory* ; Elsevier Inc., 2013; ISBN 9780123964885.
15. Wikipedia Vegetable oil fuel - Wikipedia Available online: [https://en.wikipedia.org/wiki/Vegetable\\_oil\\_fuel](https://en.wikipedia.org/wiki/Vegetable_oil_fuel) (accessed on Apr 18, 2020).
16. Beta Analytic Hydrogenation-Derived Renewable Diesel - ASTM D6866 Available online: <https://www.betalabservices.com/biofuels/renewable-diesel-hdrd.html> (accessed on Apr 18, 2020).
17. Wikipedia Diesel fuel - Wikipedia Available online: [https://en.wikipedia.org/wiki/Diesel\\_fuel#Synthetic\\_diesel](https://en.wikipedia.org/wiki/Diesel_fuel#Synthetic_diesel) (accessed on Apr 18, 2020).
18. Elobio HTU diesel Available online: <https://www.elobio.eu/biofuels/htu-diesel/> (accessed on Apr 18, 2020).
19. US Federal Aviation Administration New Alternative Jet Fuel Approved Available online: [https://www.faa.gov/news/updates/?newsId=85425&omniRss=news\\_updatesAoc&cid=101\\_N\\_U](https://www.faa.gov/news/updates/?newsId=85425&omniRss=news_updatesAoc&cid=101_N_U) (accessed on Apr 18, 2020).
20. ICAO *ICAO Environmental Report- Aviation and Climate Change* ; 2010;
21. Wikipedia Aviation biofuel - Wikipedia Available online: [https://en.wikipedia.org/wiki/Aviation\\_biofuel](https://en.wikipedia.org/wiki/Aviation_biofuel) (accessed on Apr 18, 2020).
22. Wikipedia Jet fuel - Wikipedia Available online: [https://en.wikipedia.org/wiki/Jet\\_fuel](https://en.wikipedia.org/wiki/Jet_fuel) (accessed on Apr 18, 2020).
23. Wang, W.C.; Tao, L. Bio-jet fuel conversion technologies. *Renew. Sustain. Energy Rev.* **2016**, *53*, 801–822.
24. Wikipedia Pyrolysis oil - Wikipedia Available online: [https://en.wikipedia.org/wiki/Pyrolysis\\_oil](https://en.wikipedia.org/wiki/Pyrolysis_oil) (accessed on Apr 18, 2020).
25. Sadaka, Sammy; Boateng, A.A. *Agriculture and Natural Resources* .
26. Devarapalli, M.; Atiyeh, H.K. A review of conversion processes for bioethanol production with a focus on syngas fermentation. *Biofuel Res. J.* **2015**, *7*, 268–280,
27. Zabel, H.; Sahu, J.N.; Suely, A.; Boyce, A.N.; Faruq, G. Bioethanol production from renewable sources: Current perspectives and technological progress. *Renew. Sustain. Energy Rev.* **2017**, *71*, 475–501.
28. Markowska, A.; Michalkiewicz, B. Biosynthesis of methanol from methane by *Methylosinus trichosporium* OB3b. *Chem. Pap.* **2009**, *63*, 105–110, doi:10.2478/s11696-008-0100-5.
29. Thuijl, E.V.; Ree, R.V.; Lange, T.J.D. *Biofuel Production Chains: Background Document for Modelling the EY Biofuel Market using the BIOTRANS Model* ; 2003;
30. De Falco, M. *Dimethyl Ether (DME) Production* ;
31. Wikipedia Dimethyl ether - Wikipedia Available online: [https://en.wikipedia.org/wiki/Dimethyl\\_ether](https://en.wikipedia.org/wiki/Dimethyl_ether) (accessed on Apr 18, 2020).
32. Azizi, Z.; Rezaeimanesh, M.; Tohidian, T.; Rahimpour, M.R. Dimethyl ether: A review of technologies and production challenges. *Chem. Eng. Process. Process Intensif.* **2014**, *82*,