



	SEKAB	Sweden	Ornskoldsvik	Enzymatic hydrolysis	wood biomass	Yes	Yes	Yes								<a href="https://www.sekab.com/en/">https://www.sekab.com/en/</a>	
	SINTEF	Norway	Oslo, Norway	Catalytic, solvolytic lignin conversion in batch mode (up to 2L)	Technical lignins, black liquor, crude bio oils	Yes	Yes	No								<a href="https://www.sintef.no/">https://www.sintef.no/</a>	
	SINTEF	Norway	Oslo, Norway	Catalytic, solvolytic lignin conversion in continuous mode (up to 400 g/h)		Yes	Yes	No								<a href="https://www.sintef.no/">https://www.sintef.no/</a>	
	SINTEF	Norway	Trondheim, Norway	Electrochemical lignin conversion, continuous pilot plant with integrated product fractionation and purification (TRL6)	Technical lignins, black liquor	Yes	Yes	No								<a href="https://www.sintef.no/">https://www.sintef.no/</a>	
	SINTEF	Norway	Oslo	Electrochemical lignin conversion, small continuous pilot plant with offline product fractionation and purification (TRL4)	Technical lignins, black liquor											<a href="https://www.sintef.no/">https://www.sintef.no/</a>	
	SINTEF	Norway	Trondheim, Norway	Twin screw compounder for pretreatment, extraction and reaction(TRL6)	Woody biomass, lignins	Yes	Yes	No								<a href="https://www.sintef.no/">https://www.sintef.no/</a>	
	ST Oy	Finland	Kajaani	Celulosic process, TD DDO 1/a SW hydrolysis lignin (steam explosion, enzymatic hydrolysis, fermentation)	Softwood sawdust (pine, spruce)	Yes	Yes	Yes		yes	2019					<a href="https://www.st.com">https://www.st.com</a>	<a href="https://www.nmbu.no/download/file/fid/3444">https://www.nmbu.no/download/file/fid/3444</a>
	Stora Enso Oy	Finland	Sunila	Kraft lignin (50.000 t/a)												<a href="https://www.storaenso.com/en/products/lignin">https://www.storaenso.com/en/products/lignin</a>	
	Suzano	Brazil	Campinas	Kraft pulp/paper mill	eucalyptus			yes	Ecolog	yes						<a href="https://www.suzanoocfla.com.br/ocfla_zhp">https://www.suzanoocfla.com.br/ocfla_zhp</a>	
	Sweetwater Energy, Inc.	USA	Rochester, New York	Proprietary thermomechanical enzymatic hydrolysis - sunburst process	44 itemized hardwoods, softwoods, and grasses	Yes	Yes	Yes		yes						<a href="https://www.sweetwater.us/process/">https://www.sweetwater.us/process/</a>	<a href="https://www.sweetwater.us/products/">https://www.sweetwater.us/products/</a>
	The Dallas Group of America Inc	USA		Sulphite process				yes			2020					<a href="https://dallagrp.com/products-applications/">https://dallagrp.com/products-applications/</a>	
	TNO	Netherlands		Fabiola (mild aqueous acetone organosolv)	Hardwood, herbaceous, food-processing residues	yes	yes	No		yes	2020					<a href="http://www.unravel-bb.eu">www.unravel-bb.eu</a>	10.13140/RG.2.2.28993.28007
	Trinity College Dublin	Ireland	Dublin	Lignin valorisation, twin screw compunder for pre-treatments, autoclave for extraction	lab						2020					<a href="https://www.tcd.ie/">https://www.tcd.ie/</a>	
	TU Wien	Austria	Vienna	Ethanol Organosolv	multiple feedstocks of annual plants and wood residues	yes	yes	No	nano-lignins	since 2019						<a href="https://www.tuwien.at/en/thermo-process-en-gineering-and-simulation/research-focus-biorefinery/EN/">https://www.tuwien.at/en/thermo-process-en-gineering-and-simulation/research-focus-biorefinery/EN/</a>	
	Universidad de Córdoba	Spain	Córdoba													<a href="http://www.uco.es/en/qe-lab/">http://www.uco.es/en/qe-lab/</a>	
	University of Aveiro	Portugal	Aveiro	Lignin characterization, fractionation and targeted modification for the advanced applications (organosolv, kraft lignin and lignosulphonates). Lignin valorization into adhesives, resins, polyols, composites, new polymeric formulations, concrete additives, coatings and low molecular added-value products												<a href="https://www.ua.pt/en/university">https://www.ua.pt/en/university</a>	
	University of California	USA	California	THF-Organosolv, Klason lignin		Yes	No	No		yes	2020					<a href="https://www.frontiersin.org/article/10.3389/feng.2020.00149/fulltext">https://www.frontiersin.org/article/10.3389/feng.2020.00149/fulltext</a>	
	University of Edinburgh, UK Biochar Research Centre	United Kingdom	Edinburgh	Lignin pyrolysis to produce carbon products and chemicals	lignin from different sources	yes	50kg/h			yes						<a href="http://www.biochar.ac.uk">www.biochar.ac.uk</a>	further research and development to be carried out in a soon to start H2020 project BIOMAC
	University of Florida	USA	Perry, Florida	Pretreatment and liquefaction	sugar cane sweet sorghum stalks	Yes	Yes	No		until 2015	2018					<a href="https://www.biofuelsdigest.com/bdigest/2018/06/06/university-of-florida-see-cellulosic-ethanol-production-at-1-50-per-gallon/">https://www.biofuelsdigest.com/bdigest/2018/06/06/university-of-florida-see-cellulosic-ethanol-production-at-1-50-per-gallon/</a>	
	University of Groningen	Netherlands	Groningen	lab-scale: Conversion of technical lignins by hydrotreatment and ozone treatment and combinations	pyrolytic lignin (PL), Kraft lignin (KL), and Fabiola organosolv lignin (OL)	yes	no	no								<a href="https://doi.org/10.1002/advs.201900147">https://doi.org/10.1002/advs.201900147</a>	
	University of Limerick	Ireland	Limerick	Lignin based carbon fibres; Lignin based carbon nanofibres; Lignin for energy storage (battery anodes, supercapacitors); Lignin for energy generation (thermoelectrics)	Hardwood, softwood, agricultural waste, technical lignins						2020					<a href="https://www.ul.ie/">https://www.ul.ie/</a>	
	University of Ljubljana	Slovenia	Ljubljana	Liquefaction, coating procedures (paper, cardboard board etc.)							2020					<a href="http://www.lj.si/en/wood-technology/department/">http://www.lj.si/en/wood-technology/department/</a>	
	University of Maine	USA	Orono, Maine	high temperature, dilute acid-catalyzed, rapid hydrolysis of lignocellulosic biomass		yes	yes		biochar and lignin as		2020					<a href="http://bofinetechnology.com/">http://bofinetechnology.com/</a>	
	University of Pisa, Department of Chemistry and	Italy	Pisa	Fractionation of biomasses, lab-scale production of organosolv and acid lignins*							2020					<a href="https://www.dccs.unipi.it/">https://www.dccs.unipi.it/</a>	
	UPM Biochemicals	Finland	Germany	kraft and sulfite processes				yes	BIOPVA		2020					<a href="https://www.upmbiochemicals.com/products/lignin/">https://www.upmbiochemicals.com/products/lignin/</a>	
	VAPo oy	Finland	Seelen	ethanol - HighT <sup>o</sup> ; highP	hardwood, maybe agro-waste						2018					<a href="https://www.vapogroup.com/">https://www.vapogroup.com/</a>	<a href="https://www.interregvnrp.eu/fileadmin/user_upload/tx_sevprojects/library/Elle_1529400425.pdf">https://www.interregvnrp.eu/fileadmin/user_upload/tx_sevprojects/library/Elle_1529400425.pdf</a>
	vertoro	Netherlands	Seelen	mild solvolysis		yes			goldlocks	yes	2020					<a href="https://vertoro.com/technology/">https://vertoro.com/technology/</a>	
	Vito	Belgium		LignoValue: production of bioaromatics via metal catalyzed depolymerization of lignin	wood ; lignins					yes	2019					<a href="https://vito.be/en/news/ligno-value-pilot-launched">https://vito.be/en/news/ligno-value-pilot-launched</a>	<a href="https://www.biorizon.eu/news/ligno-value-pilot">https://www.biorizon.eu/news/ligno-value-pilot</a>
	VTT	Finland		Biomass fractionation/pre-treatments (soda, kraft, organosolv cooking, steam explosion), Enzymatic and chemical												<a href="https://www.vttresearch.com/en/our-services/biomass">https://www.vttresearch.com/en/our-services/biomass</a>	<a href="https://ligniox.eu/wp-">https://ligniox.eu/wp-</a>
	West Fraser	Canada		Kraft	lignin from west Fraser pulp mills (spruce, pine, and fir)			yes		smaller LPH	yes	2020				<a href="https://www.westfraser.com/products/smallin-0">https://www.westfraser.com/products/smallin-0</a>	
	WestChem Inc.	USA	Lakewood, Colorado	ASRitz digester capable of steam explosion, auto hydrolysis, dilute acid hydrolysis, sulfite processes, and enzymatic	Softwood, Hardwood, Agricultural waste	yes					2020					<a href="https://www.west2lc.com/">https://www.west2lc.com/</a>	sugar and lignin production capabilities-rl-

**date of viewing** General information resources incorporated in the table

- 2020 <https://www.bi-lignin.com/members/database.php?topic=producto>
- 2020 <https://ligninlab.fi/>
- 2020 <http://www.bio-based.eu/BIBI/>
- 2020 <https://www.energy.gov/eere/energy/cellulosic-sugar-and-lignin-production-capabilities-rl->
- 2020 <http://www.agriobase.com/en/database/suppliers/chemistry-formulation-synthesis/greenvalue-enterprises-lic>
- 2020 [https://publications.jrc.ec.europa.eu/repository/bitstream/JRC113216/online\\_biorefineries\\_research\\_br\\_2020\\_of.pdf](https://publications.jrc.ec.europa.eu/repository/bitstream/JRC113216/online_biorefineries_research_br_2020_of.pdf)
- 2020 <https://biorefineria.blogspot.com/listado-de-biorefineries.html?m=1>