

PRODUCTION OF ETHAN	IOL VIA THE FERMENT	ATION O	F LIGNOC	ELLULUS	IC DICIVIA	455 (LC-e	tnanoi)				
Date of factsheet	28.04.2021										
uthor	Ayla Uslu										
ector	Transport										
ETS / Non-ETS	Non-ETS										
Type of Technology	Biomass										
Description	Advanced or second-generation et treatment, enzymatic hydrolysis, fe	ermentation and	d recovery of et	thanol as a fina	al product. The	pre-treatment	process is aim	ed at optimising	g the hydrolysis	and the follo	wing processe
	The pretreatment method depends on the characteristics of the raw material. During the pre-treatment cellulose and hemicellulose are separated from lignin. Lignin is usually separated and dried to serve as fuel for the processes. Cellulose is broken down into glucose during the enzymatic hydrolysis (also called saccharification). Hemicellulose is also										
	converted into fermentable sugar. In the fermentation process, all sugars are converted into bioethanol by various microorganisms. The product from fermentation has low concentration of bioethanol, hence an upgrade to the desired high concentration through evaporation and ratification is the final step so the resulting ethanol can be used as biofuel In this factsheet, we assume that the process' energy demand is supplied via combustion of lignin. Thus, no external energy supply is required and net electricity may be generated										
	depending on the operating mode.										
TRL level 2020	TRL 8										
	n Europe there is only one commercial plant (TRL9) in Norway. This plant uses brown liquor from the pulping operations. Other operating plants are at demonstration scale (TRL 6-7). lowever, most of the plants under construction or are planned have the TRL 8. the most recent information about the status of the plants can be found in ETIP (2020).										
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ECHNICAL DIMENSIONS											
	Functional Unit						Value and Rar	nge			
Capacity	Mwout					1	77.00		<u></u>		
				66.00			-			77.00	
Potential			Current			2030			2050		
Potential			Min	-	May	Min	<u>-</u> T _	Max	Min	- T -	1.400
Market share		%		<u> </u>	Max		<u> </u>			<u> </u>	Max
Capacity utlization factor			Min		Max	Min	<u> </u>	Max	1.00	_	Max
Full-load running hours per year								5	3,000.00		
Jnit of Activity											
Fechnical lifetime (years)									20.00		
Progress ratio											
Hourly profile											
Explanation	The functional unit refers to MWth	The functional unit refers to MWth ethanol output. Currently, there are no commercial plants at large scale that are operational and producing LC ethanol in Europe. The Beta									
	Renewables plant in Italy was a firs	t-of-a-kind com	mercial plant w	vith 100-150 M	IWth input capa	acity. This plan	t was terminat	ed in 2017 due	to financial issu	ies in one of t	•
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COSTS	Renewables plant in Italy was a firs companies . The plant was bought	st-of-a-kind com by Versalis in 20	mercial plant w	vith 100-150 M	IWth input capa	acity. This plan	t was terminat	ed in 2017 due	to financial issu	ies in one of t	•
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Year of Euro nvestment costs Other costs per year	Renewables plant in Italy was a firs companies . The plant was bought as feedstock. 2015 Euro per Functional U mln. € / MW mln. € / MW	st-of-a-kind com by Versalis in 20	nmercial plant w	Current 3.80 -	IWth input capa	acity. This plan y will start its o	2030 2.85	red in 2017 due rwegian plant B	to financial issu	2050 1.90	ng brown liquo
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EMISSIONS (Non-fuel/energy-related en	nissions or emissions reductions (e.g. CCS)									
	Substance	Unit	Current -			2030			2050		
			Min	_	Max	Min	_	Max	Min	-	Max
				-			-			-	
Emissions			Min	_	Max	Min	_	Max	Min	-	Max
				-			-			-	_
			Min	-	Max	Min	_	Max	Min	-	Max
				-	_		-	_		-	_
			Min	-	Max	Min	_	Max	Min	-	Max
Emissions explanation											
OTHER											
Parameter	Unit			Current		2030			2050		
				-	_		-	_		-	•
			Min	-	Max	Min	_	Max	Min	-	Max
				-	•		-	•		-	1
			Min	_	Max	Min	_	Max	Min	-	Max
				-	•		-	•		-	
			Min	_	Max	Min	_	Max	Min	-	Max
				-			-			-	1
			Min	_	Max	Min	_	Max	Min	_	Max
Explanation											
REFERENCES AND SOURCES											
	es basisbedragen. https://www.pb										
2 IEA, 2020. Advanced	d Biofuels-Potential for cost reduc	tion. See https://	www.ieabioer/	ergy.com/wp-	content/upload	ls/2020/02/T41	_CostReductio	nBiofuels-11_0	2_19-final.pdf		
3 ETIP, 2020. Bioenerg	y-Current status of advanced biofu	uel demonstration	ns in Europe. S	ee https://wwv	v.etipbioenergy	/.eu/databases	/reports/443-c	urrent-status-o	f-advanced-bio	fuels-demonst	rations-in-
europe	europe										