



MAABJERG
ENERGY CONCEPT
HOLSTEBRO STRUER

The MEC BIOREFINERY



EBTP - 6th Stakeholder Plenary Meeting of the European Biofuels Technology Platform
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Flagship project description

- Concept/history/ownership structure
- Societal impact
- Sourcing and Logistics
- The ethanol plant/new technology/timeline
- Remaining issues to be solved



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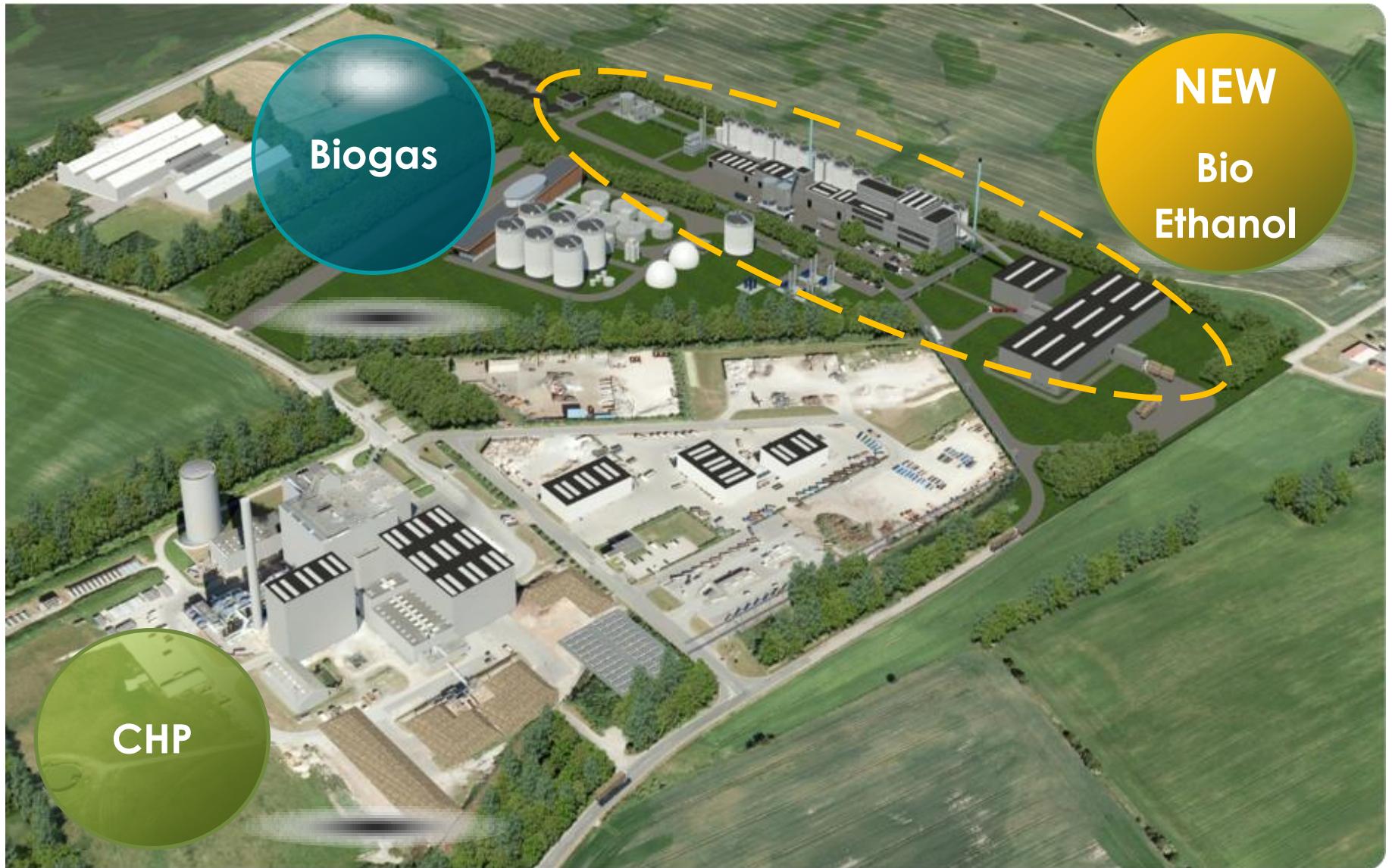
THE CONCEPT



The Biorefinery – an ambitious Flagship project based on local residues and highly integrated



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MEC Biorefinery – timeline

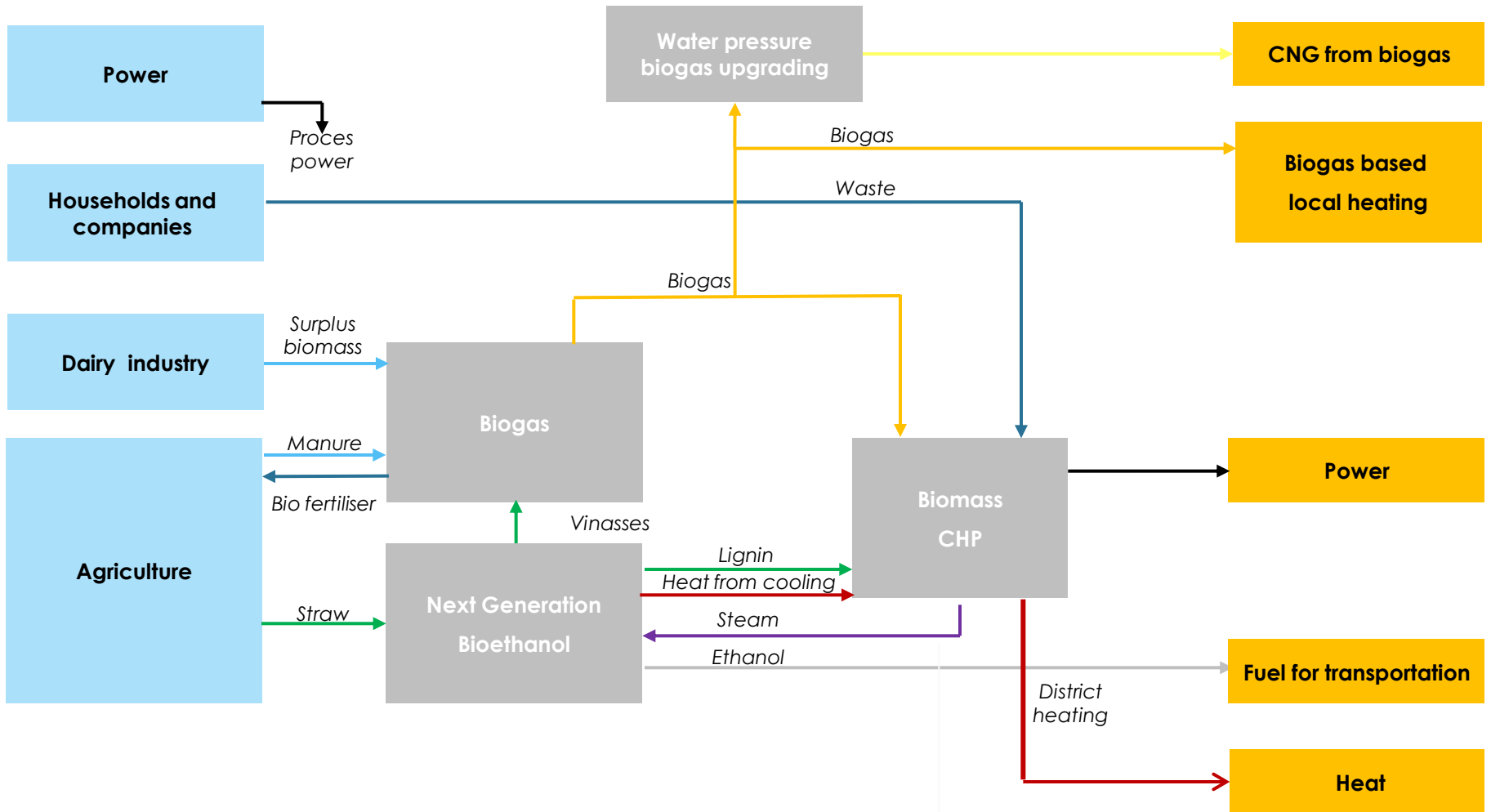
Year	
1992	Start up of Biomass/gas fired CHP
2012	Start up of Biogas plant
2017	Expected start up of 2G bioethanol plant and biogas upgrading plant
After	Expected to add chemical production and waste handling facilities



Main streams

Input suppliers

Output

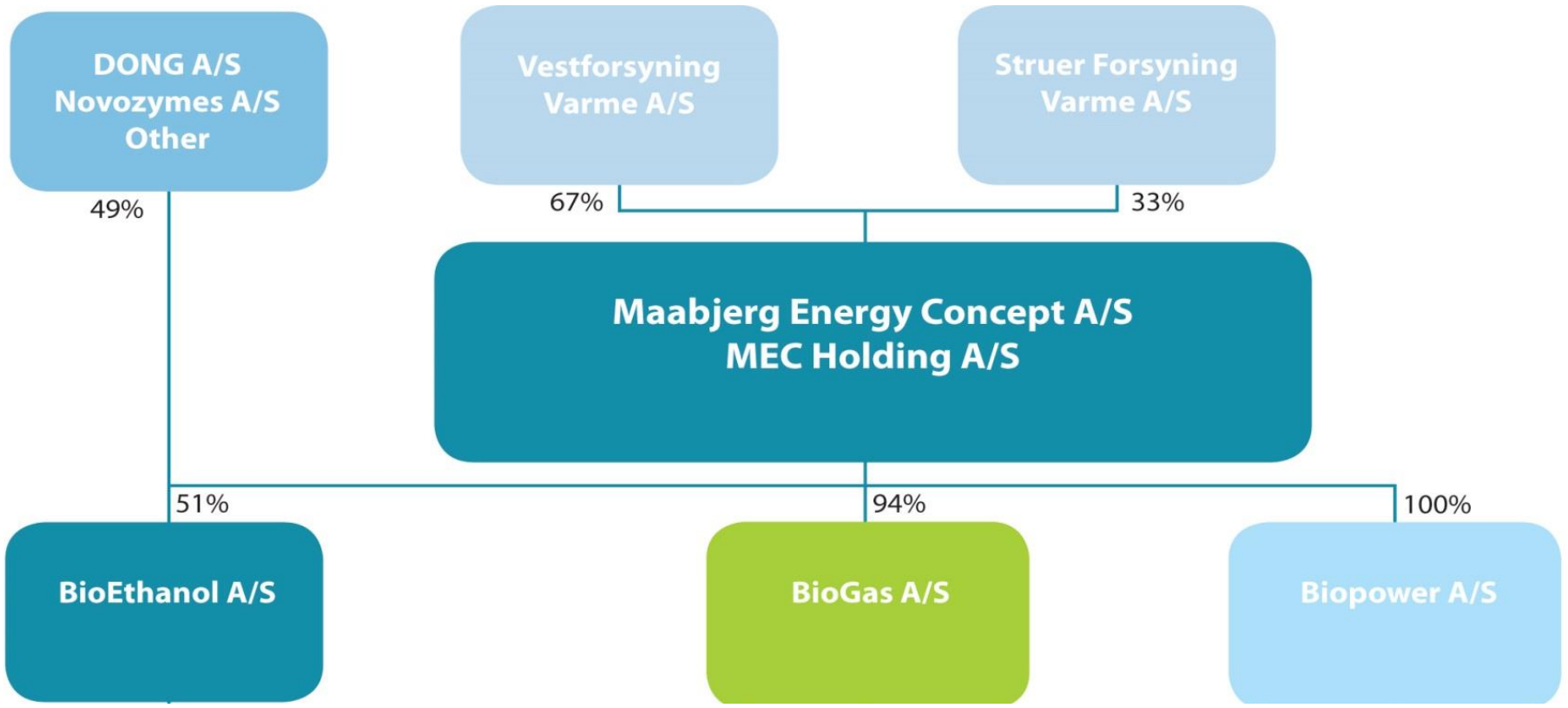




The MEC Financial Model

- Investments in new plant and renovation of existing plants amounts to 294 MEUR
- Yearly turnover of the bio refinery of 147 MEUR
- Combination of good operation margins and “soft” finance offers attractive IRR

The MEC Group – A Public Private Ownership





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SOURCING AND LOGISTICS





Input & output

Input

- 90 GWh power
- 50.000 tons of household waste
- 100.000 tons of industrial waste
- 120.000 tons of waste water sludge
- 185.000 tons of biomass from dairies etc.
- 500.000 tons of manure
- **300.000 tons of straw**

MEC – plants

Biomass based power and heating

58.000 t
Lignin



2. Generation bioethanol



92.000 t
Vinasses

CNG
Biogas

Output

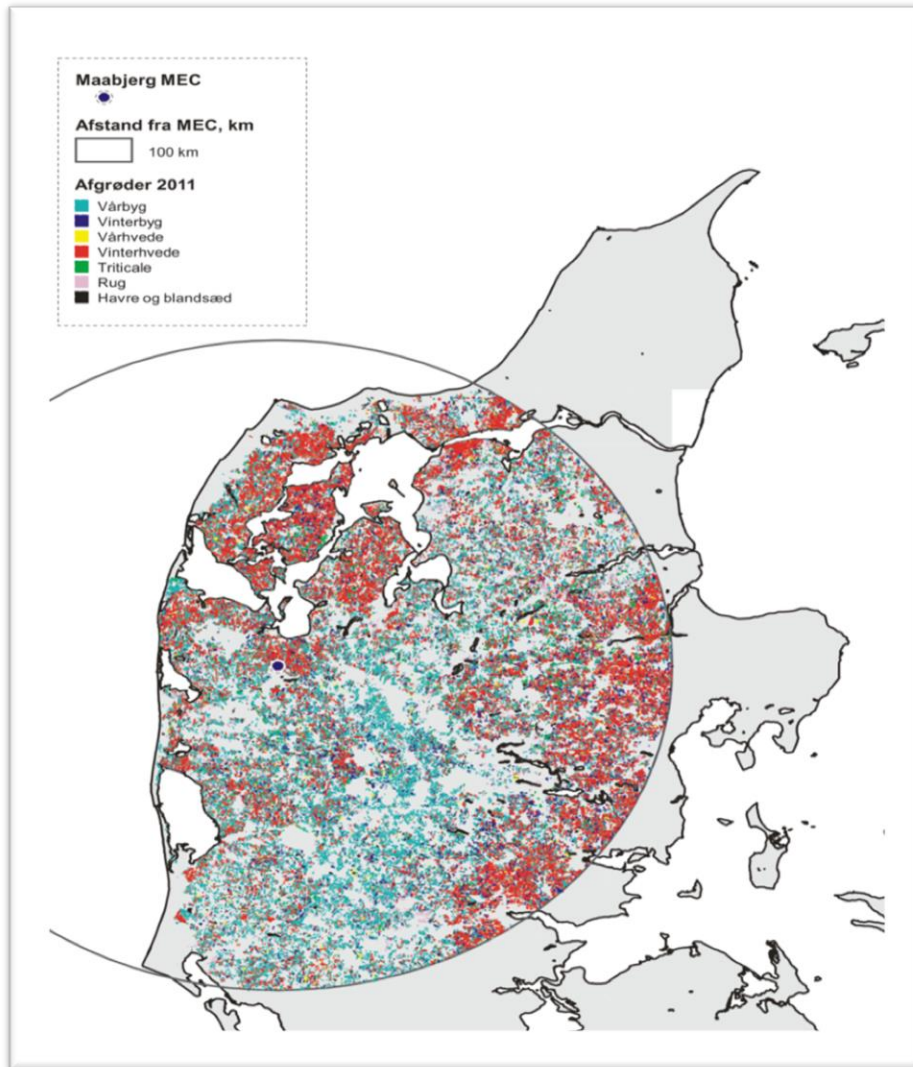
- 140 GWh power
- 1.766 TJ of heating for 20.000 house holds
- 80 mill. litres of 2G bio ethanol
- 34.000 tons of lignin
- 10 mill. m³ of biogas
- 16 mill. m³ of CNG
- 600.000 tons of fertiliser



Transport of manure and liquid waste (800.000 t/year)



The MEC Sourcing Model of straw (300.000 t/year)



- Unused straw amounts to 1,2 million tonnes in Jutland
- Denmark has 20 years of experience of large scale handling of straw supply for peak load in CHPs
- Establishment of a 10-year contract model for the straw supply based on tenders
- The contracts will be signed with one or several private companies that specialize in supplying straw in large quantities to the existing market for power plants



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2G ETHANOL





The MEC project - DENMARK

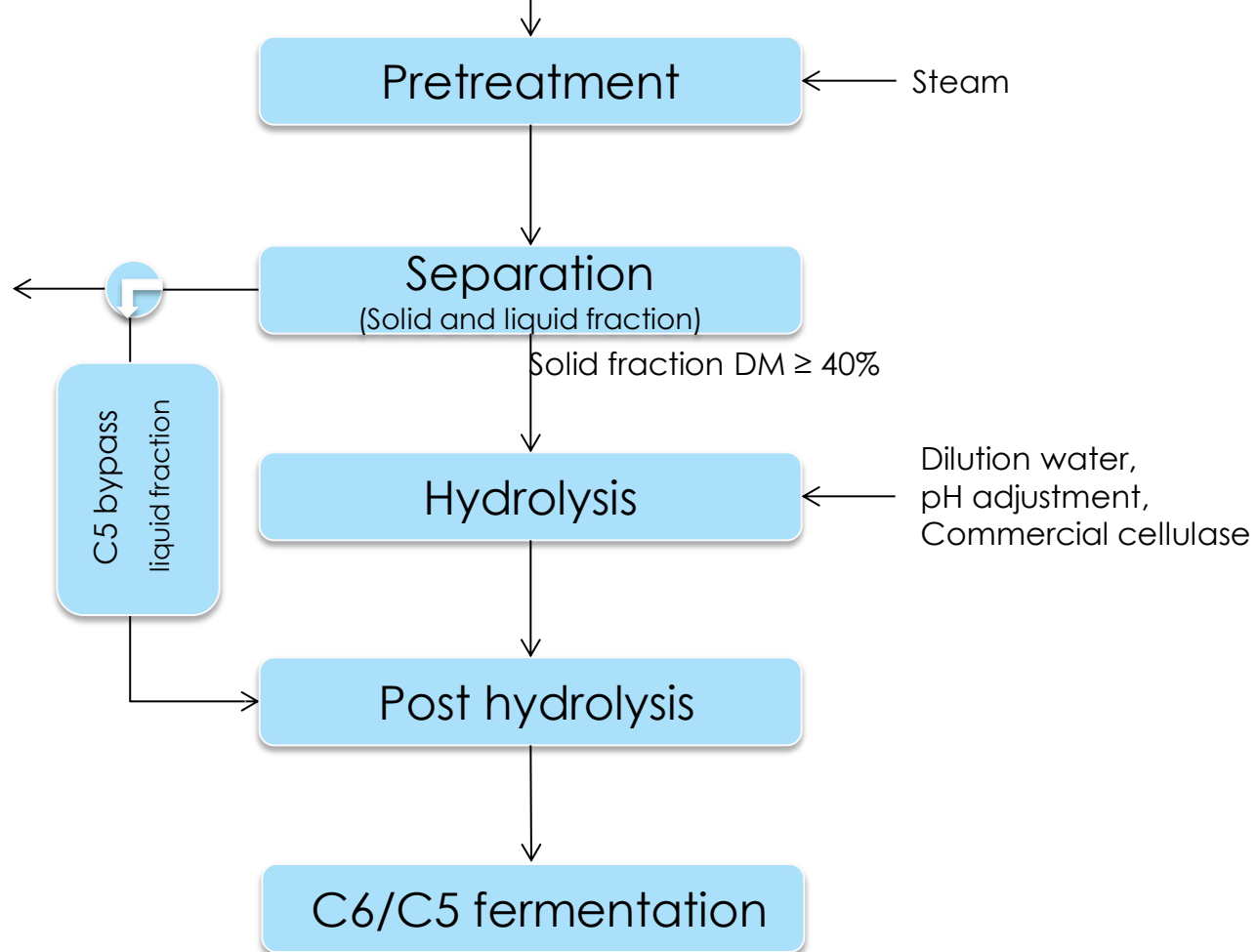
- Capacity: 37.5 t/h wheat straw (DM 86%)
- Technology: Steam pretreatment and mixed sugar fermentation
- Integration: Existing Biogas and Combined Heat and Power plant
- Output: 2G ethanol, lignin and vinasses (high DM) for biogas production



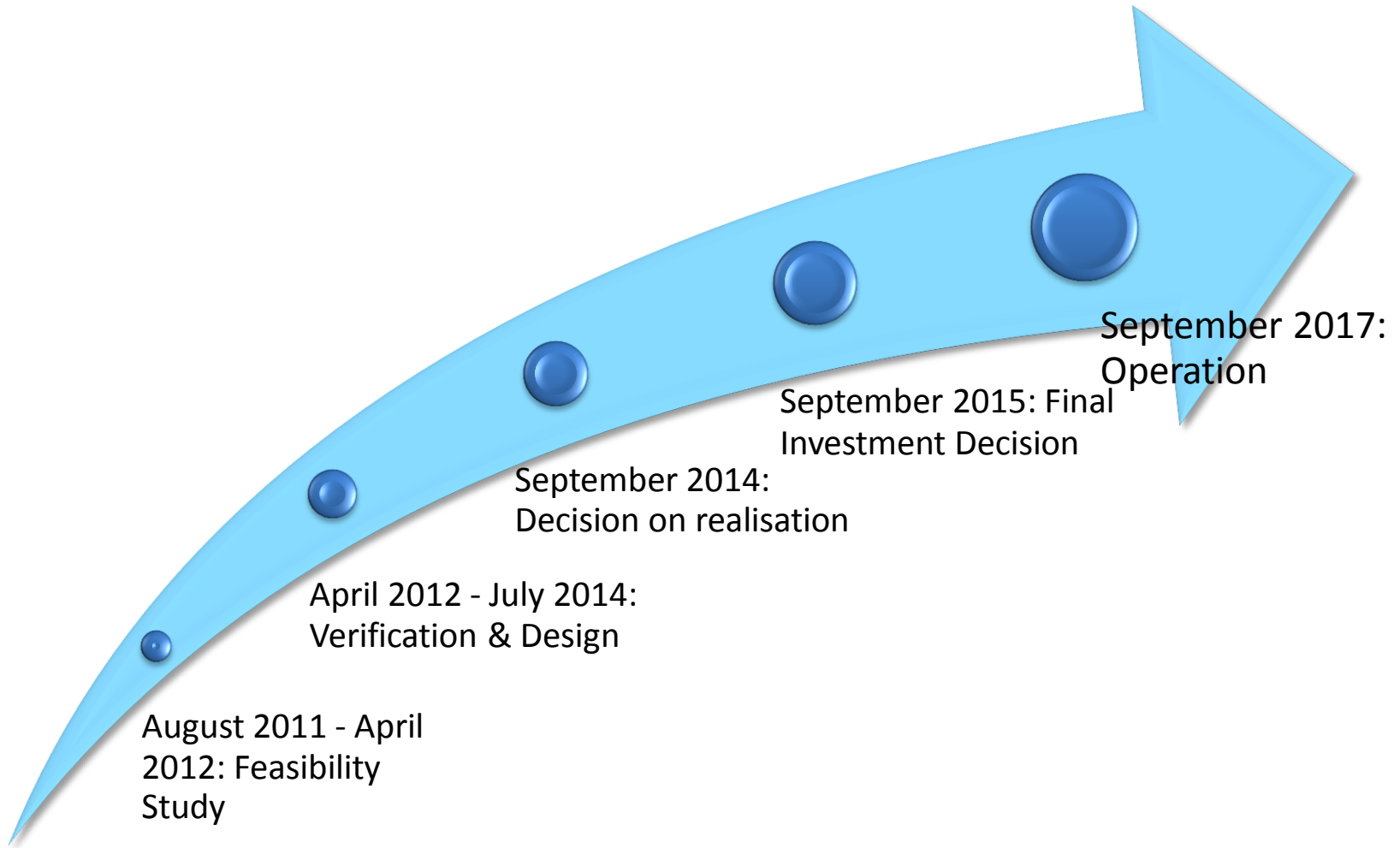
C6+C5 mixed fermentation – proven in demo scale 2013

Inbicon Concepts

Soft lignocellulosic biomass soaked, washed or wetted to DM > 35%



Time table





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REMAINING ISSUES TO BE SOLVED





What is needed to finalize biorefinery

- Detailed engineering and tenders
- Financing
- Permission to ownership structure (new Public Private Partnership concept)
- Longterm off-take agreements on ethanol or blending mandate that can absorb the production



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SOCIETAL IMPACT





Lower CO₂ emissions and Green jobs

CO ₂ -reduction MEC			Calorific value	Energy	CO ₂	CO ₂ reduction
Source	Unit	Amount	(GJ/unit)	(GJ)	(t/GJ)	(t)
Bio-ethanol replaces petrol	m ³	78 720	21,20	1 668 864	0,0728	121 493
Biogas replaces natural gas	m ³	18 779 000	0,02	439 429	0,0567	24 916
Lignin replaces waste locally	t	56 999	10,00	569 990	0,0325	18 525
Lignin replaces coal centrally	t	36 121	29,30	1 058 345	0,0936	9 061
Total						263 995

Socio Economic effects	Investment	Operation
Primary activity (million DKK)	2 200	1 100
GDP influence (million DKK)	1 850	1 000
Total employment (number of full time jobs)	1 250	1 000
Public budget balance (million DKK)	1 550	680
Effects on net balance of payments (million DKK)	-1 350	680

Questions and comments

