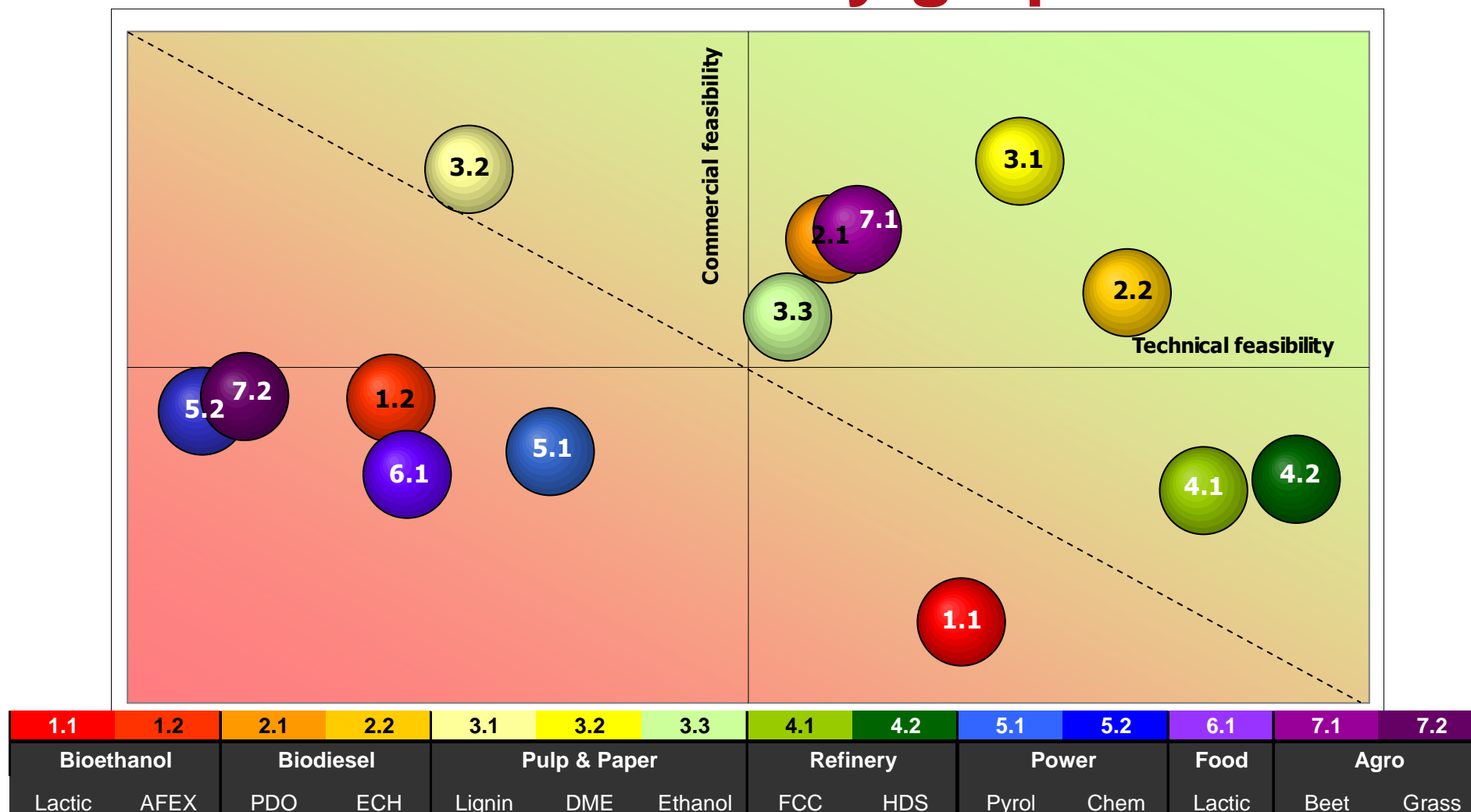




PortfolioScan of integrated biorefineries

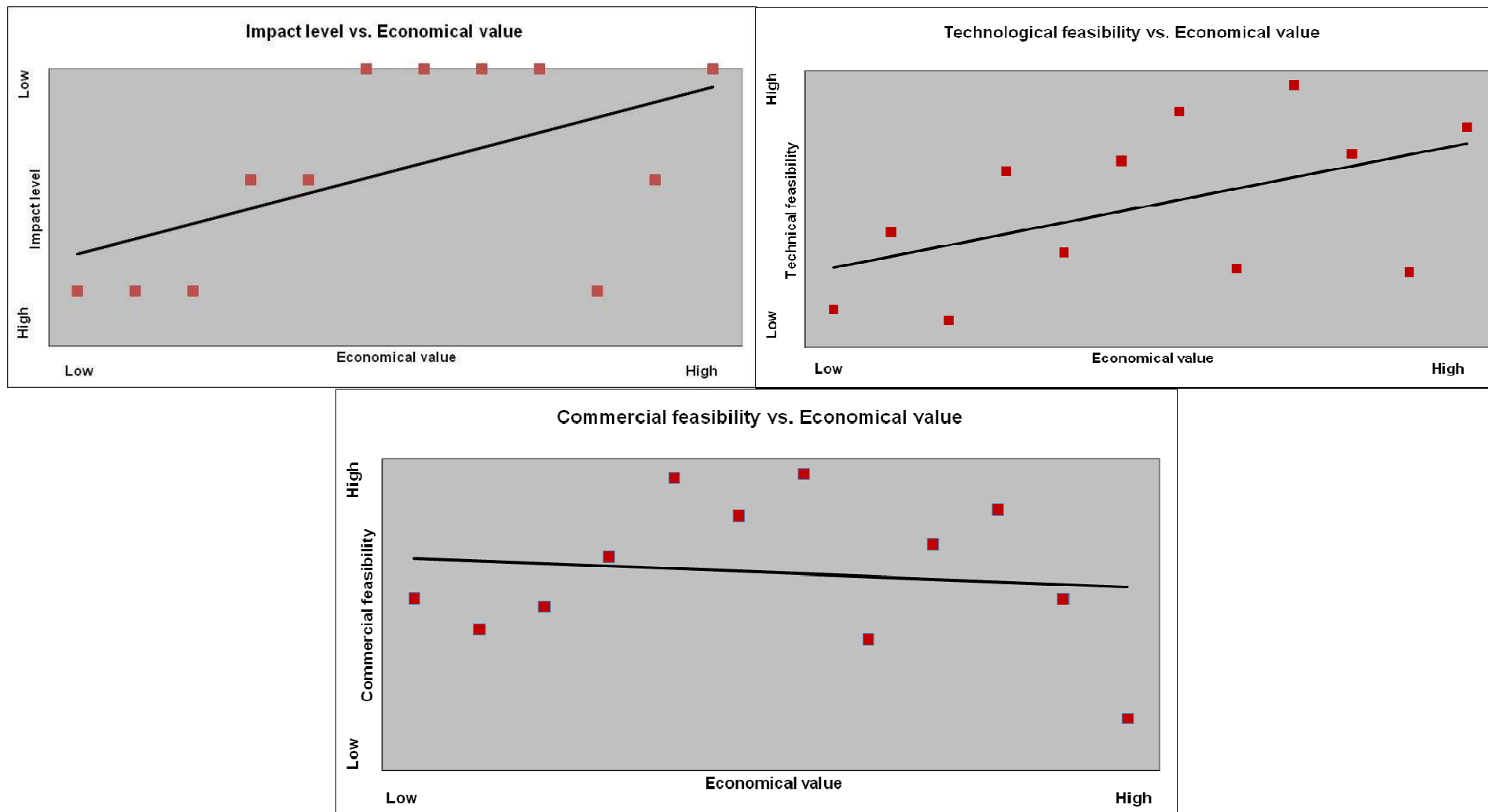
Philippe Willems (VFT, Belgium)
Final BiOREF-INTEG Seminar
9 June 2010, Düsseldorf, Germany

Cross sector feasibility graph



	Subjective criteria			Objective criteria	
	Impact level	Technical feasibility	Commercial feasibility	New target sales price (for IRR 20%)	% change vs market price (for IRR 20%)
Bioethanol: reference				€775/T ethanol	-3%
Bioethanol: lactic	Low	78%	56%	€545/T ethanol	-32%
Bioethanol AFEX 80	Medium	60%	69%	€710/T ethanol	-11%
Biodiesel: reference				€765/T biodiesel	9%
Biodiesel: PDO	Low	74%	79%	€815/T biodiesel	16%
Biodiesel: ECH	Low	83%	75%	€735/T biodiesel	5%
Pulp & Paper: reference				€630/T pulp	26%
Pulp & Paper: lignin	Low	80%	83%	€550/T pulp	10%
Pulp & Paper: DME	Medium	62%	83%	€710/T pulp	42%
Pulp & Paper: ethanol	Medium	72%	74%	€990/T pulp	98%
Refinery: reference FCC				n.a.	n.a.
Refinery: veg. oil in FCC	High	86%	64%	n.a.	n.a.
Refinery: reference HDS				n.a.	n.a.
Refinery: veg. oil in HDS	High	89%	64%	n.a.	n.a.
Power: reference CHP				€150/MWh	200%
Power: CHP/pyrolyse	High	65%	66%	€185/MWh	270%
Power: reference gasification				€110/MWh	120%
Power: gasification/chemicals	High	53%	68%	€200/MWh	300%
Food: reference				€2.250/T cheese	0%
Food: lactic	Low	60%	65%	€2.050/T cheese	-9%
Agro: reference beet				€430/T sugar	8%
Agro: decentralised beet	High	75%	79%	€385/T sugar	-4%
Agro: reference grass				€280/MWh	460%
Agro: grass biorefinery	High	55%	69%	€330/MWh	560%

Correlation attempts: extra insight



Cross sector overview against average

Project type	Impact level	Technical feasibility	Commercial feasibility	Return on investment
Co-product valorisation	Low	Higher	Higher	Higher
Co-production	Low/Med/High	Higher	Average	Higher
Fermentation	Low/Med	Average	Average	Higher
Power generation	High	Lower	Average	Lower
Thermal treatment	Med/High	Lower	Lower	Lower
Legislation-driven	High	Higher	Lower	Lower

Challenging conclusion

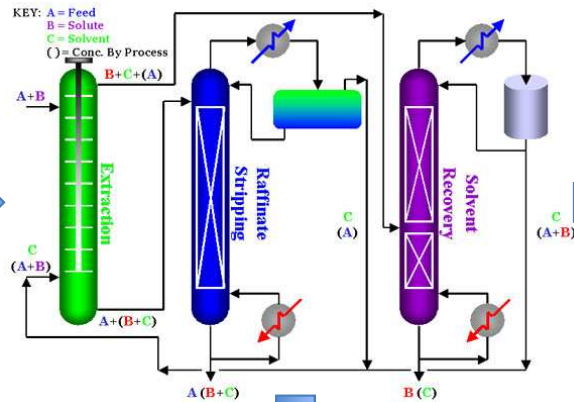
**TO IMPROVE BIOREFINERY SCHEMES,
MOST FOCUS SHOULD GO ON
CHEMICALS, MATERIALS...
BASED ON IDENTIFIED MARKET DEMAND**



Biorefinery concept focus?



**100%
IN**

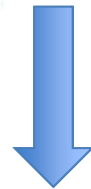


**50%
MAIN**



50%

CO-PRODUCT



QUESTIONS?



PANEL DISCUSSION

**In what biorefinery would you invest
€100 million?**

