Supplementary

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Towards the Development of a Bio-based Economy in Europe and India

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Supplementary Information

In the supplementary information the detailed responses of the survey are given. The results are grouped into the 4 main categories, being, (1) biomass production, (2) by-products and waste, (3) biorefineries and (4) policy, market and products. Per category the number of respondents and responses are given separately for india and EU. In addition, also an overview is given of the results of each potential research and development recommendation belonging to the category under consideration. To facilitate interpretation the recommendations are grouped according to the different subthemes, which are highlighted in yellow. In different tables several views are given of the results, being the overall results, the results per type of organisation and the results per type of sector. The results are always normalized to the number of respondents, indicating thus the percentage of persons that selected a specific recommendation. As all respondents were allowed to select 3 recommendations in each category, the total amounts to approximately 300%.

Category 1. Biomass production

Total India:

- 67 respondents
- 194 responses

Total EU:

- 129 respondents
- 377 responses

General overview

Biomass production			
Answer Options	**India-tot (%)**	**EU-tot (%)**	**average**
Biodiversity	17.9	12.4	15.2
Research on the bioprospecting and sustainable exploitation of the rich biodiversity of medicinal and /or	17.9	12.4	15.2
Improved plant production by geno- and phenotyping	44.8	30.2	37.5
Set-up of a genotypic and phenotypic inventory of seed bank material, landraces and wild plants.	9.0	5.4	7.2
Research on the phenotyping of plants to obtain improved crop performance including marginal lands,	35.8	24.8	30.3
Development of new cops (high yielding/high straw, dedicated energy, resilient)	53.7	54.3	54.0
Development of new crops (and biotechnology crops) allowing agricultural intensification.	7.5	10.9	9.2
Development of high yielding crop varieties providing by-products of interest (e.g. higher-straw varieties).	9.0	10.1	9.5
Development of high yielding dedicated bioenergy crops via optimized agriculture technologies with minimum	25.4	17.8	21.6
Development of more resilient crops (for instance against heat, salinity and draught), such as for instance	11.9	15.5	13.7
Full development of existing energy crops (Jatropha cultivation)	4.5	4.7	4.6
Full development of Jatropha cultivation.	4.5	4.7	4.6
Optimization of agricultural practices through breeding, modelling, monitoring	47.8	76.7	62.3
Research on breeding and/or agricultural practices to increase/stabilise plant biomass production for food	9.0	17.8	13.4
Research to better understand the range of options for fine-tuning biomass quantity and quality.	13.4	15.5	14.5
Research to provide regional solutions for optimized plant biomass production.	7.5	18.6	13.0
Demonstrate (appropriate) remote monitoring and control systems (GIS) for plant production in rural areas.	6.0	4.7	5.3
Development of strategies to restore abandoned land with adapted crops and land management.	11.9	20.2	16.0
Assessing and reducing environmental impact of biomass production	11.9	25.6	18.8
Modelling of cropping scenarios and their environmental and socio-economic impact.	11.9	4.7	8.3
Development of tools/methodologies to reduce the environmental impact of biomass production.	0.0	20.9	10.5
Forestry	6.0	10.1	8.0
Develop/set up (improved) forestry management systems for the sustainable procurement of forestry biomass	6.0	10.1	8.0
Demonstration through pilot scale programs	22.4	20.9	21.7
Demonstration and assessment of intermittent cropping and crop rotation through a pilot scale program.	0.0	5.4	2.7
Pilot demonstration and assessment of the economical sustainability of improved micro- and macro algae	22.4	15.5	18.9
Development/Research on the application of algae	80.6	57.4	69.0
Research on the exploiting the full potential of micro-algae in a biorefinery strategy.	14.9	17.1	16.0
Development of concepts for closing the nutrient loop for aqueous based plant biomass production.	3.0	5.4	4.2
Research on the phenotyping and selection of algae towards breeding of new organisms.	1.5	1.6	1.5
Development of algae-based waste water treatment systems.	28.4	16.3	22.3
Development of algae production systems for the sustainable production of renewable energy.	28.4	14.7	21.5
Development of genetic toolboxes for algae.	4.5	2.3	3.4
answered question	***67***	***129***	***196***

Figure SI.1: General overview of the responses within the category "biomass production". The recommendations are grouped in their subthemes highlighted in yellow. For each individual recommendation, the percentage of respondents are shown that selected this recommendation. The results are shown for India and EU separately. In addition, also the total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

Detailed answers in function of the type of organization

Answer Options	India-tot (%)	INDIA-INDUSTRY(%)	INDIA-academic (%)	INDIA-Oth (NGO, Gov, Oth) (%)
Biodiversity	18	11	19	23
Research on the bioprospecting and sustainable exploitation of the rich biodiversity of	18	11	19	23
Improved plant production by geno- and phenotyping	45	28	50	54
Set-up of a genotypic and phenotypic inventory of seed bank material, landraces and	9	6	11	8
Research on the phenotyping of plants to obtain improved crop performance including	36	22	39	46
Development of new cops (high yielding/high straw, dedicated energy, resilient)	54	72	50	38
Development of new crops (and biotechnology crops) allowing agricultural	7	11	8	0
Development of high yielding crop varieties providing by-products of interest (e.g.	9	22	3	8
Development of high yielding dedicated bioenergy crops via optimized agriculture	25	33	28	8
Development of more resilient crops (for instance against heat, salinity and draught),	12	6	11	23
Full development of existing energy crops (Jatropha cultivation)	4	11	3	0
Full development of Jatropha cultivation.	4	11	3	0
Optimization of agricultural practices through breeding, modelling, monitoring	48	61	39	54
Research on breeding and/or agricultural practices to increase/stabilise plant	9	11	6	15
Research to better understand the range of options for fine-tuning biomass quantity	13	22	14	0
Research to provide regional solutions for optimized plant biomass production.	7	17	6	0
Demonstrate (appropriate) remote monitoring and control systems (GIS) for plant	6	0	6	15
Development of strategies to restore abandoned land with adapted crops and land	12	11	8	23
Assessing and reducing environmental impact of biomass production	12	11	11	15
Modelling of cropping scenarios and their environmental and socio-economic impact.	12	11	11	15
Development of tools/methodologies to reduce the environmental impact of biomass	0	0	0	0
Forestry	6	11	6	0
Develop/set up (improved) forestry management systems for the sustainable	6	11	6	0
Demonstration through pilot scale programs	22	22	17	38
Demonstration and assessment of intermittent cropping and crop rotation through a	0	0	0	0
Pilot demonstration and assessment of the economical sustainability of improved	22	22	17	38
Development/Research on the application of algae	81	61	92	77
Research on the exploiting the full potential of micro-algae in a biorefinery strategy.	15	6	19	15
Development of concepts for closing the nutrient loop for aqueous based plant	3	0	3	8
Research on the phenotyping and selection of algae towards breeding of new	1	0	3	0
Development of algae-based waste water treatment systems.	28	28	31	23
Development of algae production systems for the sustainable production of	28	17	33	31
Development of genetic toolboxes for algae.	4	11	3	0
answered question	*67*	*18*	*36*	*13*

Answer Options	EU-tot (%)	EU-INDUSTRY(%)	EU-academic (%)	EU-oth (gov, other, NGO) (%)
Biodiversity	12	6	18	12
Research on the bioprospecting and sustainable exploitation of the rich biodiversity of medicinal and /or	12	6	18	12
Improved plant production by geno- and phenotyping	30	25	30	47
Set-up of a genotypic and phenotypic inventory of seed bank material, landraces and wild plants.	5	4	7	6
Research on the phenotyping of plants to obtain improved crop performance including marginal lands,	25	22	23	41
Development of new cops (high yielding/high straw, dedicated energy, resilient)	54	53	51	71
Development of new crops (and biotechnology crops) allowing agricultural intensification.	11	8	11	18
Development of high yielding crop varieties providing by-products of interest (e.g. higher-straw varieties).	10	10	11	6
Development of high yielding dedicated bioenergy crops via optimized agriculture technologies with	18	18	20	12
Development of more resilient crops (for instance against heat, salinity and draught), such as for instance	16	18	8	35
Full development of existing energy crops (Jatropha cultivation)	5	8	3	0
Full development of Jatropha cultivation.	5	8	3	0
Optimization of agricultural practices through breeding, modelling, monitoring	77	67	87	71
Research on breeding and/or agricultural practices to increase/stabilise plant biomass production for food	18	14	21	18
Research to better understand the range of options for fine-tuning biomass quantity and quality.	16	16	18	6
Research to provide regional solutions for optimized plant biomass production.	19	18	20	18
Demonstrate (appropriate) remote monitoring and control systems (GIS) for plant production in rural areas.	5	4	7	0
Development of strategies to restore abandoned land with adapted crops and land management.	20	16	21	29
Assessing and reducing environmental impact of biomass production	26	33	21	6
Modelling of cropping scenarios and their environmental and socio-economic impact.	5	8	3	0
Development of tools/methodologies to reduce the environmental impact of biomass production.	21	25	18	6
Forestry	10	16	5	12
Develop/set up (improved) forestry management systems for the sustainable procurement of forestry	10	16	5	12
Demonstration through pilot scale programs	21	22	21	18
Demonstration and assessment of intermittent cropping and crop rotation through a pilot scale program.	5	4	8	0
Pilot demonstration and assessment of the economical sustainability of improved micro- and macro algae	16	18	13	18
Development/Research on the application of algae	57	61	56	53
Research on the exploiting the full potential of micro-algae in a biorefinery strategy.	17	20	18	6
Development of concepts for closing the nutrient loop for aqueous based plant biomass production.	5	4	5	12
Research on the phenotyping and selection of algae towards breeding of new organisms.	2	2	2	0
Development of algae-based waste water treatment systems.	16	16	16	18
Development of algae production systems for the sustainable production of renewable energy.	15	20	11	12
Development of genetic toolboxes for algae.	2	0	3	6
answered question	*129*	*51*	*61*	*17*

Figure SI.2: Detailed overview of the responses within the category "biomass production" per type of organization. The recommendations are grouped in subthemes highlighted in yellow. For each individual recommendation as well as type of organization, the percentage of respondents are shown that selected this recommendation. The results are shown in separate tables for India (top) and EU (bottom). The total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

Detailed answers in function of the sector of the organization

Answer Options	India-tot (%)	INDIA-energy(%)	INDIA-chemistry (%)	INDIA-environmental (%)	INDIA-Agriculture (%)	INDIA-other (%)
Biodiversity	18	28	15	15	12	12
Research on the bioprospecting and sustainable exploitation of the rich biodiversity of	18	28	15	15	12	12
Improved plant production by geno- and phenotyping	45	28	31	46	65	41
Set-up of a genotypic and phenotypic inventory of seed bank material, landraces and	9	0	0	15	24	0
Research on the phenotyping of plants to obtain improved crop performance including	36	28	31	31	41	41
Development of new cops (high yielding/high straw, dedicated energy, resilient)	54	39	85	46	59	35
Development of new crops (and biotechnology crops) allowing agricultural	7	0	31	0	6	6
Development of high yielding crop varieties providing by-products of interest (e.g.	9	6	23	0	6	12
Development of high yielding dedicated bioenergy crops via optimized agriculture	25	28	31	23	24	18
Development of more resilient crops (for instance against heat, salinity and draught).	12	6	0	23	24	0
Full development of existing energy crops (Jatropha cultivation)	4	6	8	0	6	0
Full development of Jatropha cultivation.	4	6	8	0	6	0
Optimization of agricultural practices through breeding, modelling, monitoring	48	72	46	38	47	18
Research on breeding and/or agricultural practices to increase/stabilise plant biomass	9	11	15	0	24	0
Research to better understand the range of options for fine-tuning biomass quantity and	13	33	15	0	6	6
Research to provide regional solutions for optimized plant biomass production.	7	17	8	0	6	0
Demonstrate (appropriate) remote monitoring and control systems (GIS) for plant	6	0	0	8	6	12
Development of strategies to restore abandoned land with adapted crops and land	12	11	8	31	6	0
Assessing and reducing environmental impact of biomass production	12	17	8	31	0	0
Modelling of cropping scenarios and their environmental and socio-economic impact.	12	17	8	31	0	0
Development of tools/methodologies to reduce the environmental impact of biomass	0	0	0	0	0	0
Forestry	6	6	15	0	6	0
Develop/set up (improved) forestry management systems for the sustainable	6	6	15	0	6	0
Demonstration through pilot scale programs	22	22	15	23	18	24
Demonstration and assessment of intermittent cropping and crop rotation through a	0	0	0	0	0	0
Pilot demonstration and assessment of the economical sustainability of improved	22	22	15	23	18	24
Development/Research on the application of algae	81	72	77	92	88	71
Research on the exploiting the full potential of micro-algae in a biorefinery strategy.	15	22	15	23	0	12
Development of concepts for closing the nutrient loop for aqueous based plant	3	0	0	0	6	6
Research on the phenotyping and selection of algae towards breeding of new	1	0	0	8	0	0
Development of algae-based waste water treatment systems.	28	22	15	46	35	12
Development of algae production systems for the sustainable production of renewable	28	22	31	15	47	29
Development of genetic toolboxes for algae.	4	6	15	0	0	12
answered question	*67*	*18*	*13*	*13*	*17*	*12*

Answer Options	EU-tot (%)	EU-energy(%)	EU-chemistry (%)	EU-environmental (%)	EU-Agriculture (%)	EU-other (%)
Biodiversity	12	10	18	22	0	17
Research on the bioprospecting and sustainable exploitation of the rich biodiversity of	12	10	18	22	0	17
Improved plant production by geno- and phenotyping	30	16	26	0	57	50
Set-up of a genotypic and phenotypic inventory of seed bank material, landraces and	5	0	5	0	21	0
Research on the phenotyping of plants to obtain improved crop performance including	25	16	21	0	36	50
Development of new cops (high yielding/high straw, dedicated energy, resilient)	54	68	45	78	36	83
Development of new crops (and biotechnology crops) allowing agricultural	11	16	13	11	14	11
Development of high yielding crop varieties providing by-products of interest (e.g.	10	19	8	0	7	17
Development of high yielding dedicated bioenergy crops via optimized agriculture	18	19	11	33	14	17
Development of more resilient crops (for instance against heat, salinity and draught).	16	13	13	33	0	39
Full development of existing energy crops (Jatropha cultivation)	5	6	5	22	0	6
Full development of Jatropha cultivation.	5	6	5	22	0	6
Optimization of agricultural practices through breeding, modelling, monitoring	77	68	89	33	100	56
Research on breeding and/or agricultural practices to increase/stabilise plant biomass	18	10	21	0	36	11
Research to better understand the range of options for fine-tuning biomass quantity and	16	3	21	11	21	11
Research to provide regional solutions for optimized plant biomass production.	19	19	21	11	14	17
Demonstrate (appropriate) remote monitoring and control systems (GIS) for plant	5	13	0	11	7	0
Development of strategies to restore abandoned land with adapted crops and land	20	23	26	0	21	17
Assessing and reducing environmental impact of biomass production	26	19	26	33	29	28
Modelling of cropping scenarios and their environmental and socio-economic impact.	5	3	3	11	14	11
Development of tools/methodologies to reduce the environmental impact of biomass	21	16	24	22	14	17
Forestry	10	19	5	11	0	11
Develop/set up (improved) forestry management systems for the sustainable	10	19	5	11	0	11
Demonstration through pilot scale programs	21	26	16	0	36	11
Demonstration and assessment of intermittent cropping and crop rotation through a	5	6	5	0	14	6
Pilot demonstration and assessment of the economical sustainability of improved	16	19	11	0	21	6
Development/Research on the application of algae	57	65	55	78	43	50
Research on the exploiting the full potential of micro-algae in a biorefinery strategy.	17	16	32	0	7	17
Development of concepts for closing the nutrient loop for aqueous based plant	5	6	5	0	7	0
Research on the phenotyping and selection of algae towards breeding of new	2	0	0	0	7	0
Development of algae-based waste water treatment systems.	16	19	11	56	14	17
Development of algae production systems for the sustainable production of renewable	15	23	5	22	7	11
Development of genetic toolboxes for algae.	2	0	3	0	0	6
answered question	*129*	*31*	*38*	*9*	*14*	*18*

Figure SI.3: Detailed overview of the responses within the category "biomass production" per sector of organization. The recommendations are grouped in subthemes highlighted in yellow. For each individual recommendation as well as the sector of the organization, the percentage of respondents are shown that selected this recommendation. The results are shown in separate tables for India (top) and EU (bottom). The total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

2. Waste and by-products

Total India:

- 67 respondents
- 187 responses

Total EU:

- 130 respondents
- 374 responses

Overall comparison:

Answer Options	India-tot (%)	EU-tot (%)	average
survey	46.3%	58.5%	52.4%
Set up of a survey to assess the amount and type of waste dumped at	3.0%	10.8%	6.9%
Assessment of the composition and the generation of MSW and the	17.9%	17.7%	17.8%
Set up of a survey of the generation and available agricultural and	25.4%	30.0%	27.7%
Improved collection and utilization of wastes	65.7%	68.5%	67.1%
Development of technologies/methods to harvest, collect and use	38.8%	38.5%	38.6%
Research to the better and maximum utilization of biowaste.	26.9%	30.0%	28.4%
Development of new Technologies to convert existing (solid) waste	77.6%	72.3%	75.0%
Development of technological routes to apply on existing agro-forestry	26.9%	30.0%	28.4%
Development of technological routes to apply on existing municipal	29.9%	22.3%	26.1%
Development of technological routes to apply on existing industrial	20.9%	20.0%	20.4%
Research on wastewater treatment / bioremediation	38.8%	16.2%	27.5%
Research on plants suitable for waste treatment and conversion.	13.4%	7.7%	10.6%
Research on bioremediation, including bioremediation in sewage	25.4%	8.5%	16.9%
Conversion of CO2	26.9%	28.5%	27.7%
Development of new processes converting CO2 in bioenergy or	26.9%	28.5%	27.7%
Development of routes to convert wastes to a platform system for	23.9%	43.8%	33.9%
Development of improved and safer conversion processes of wastes	10.4%	22.3%	16.4%
Development of new routes for waste valorisation biobased products	6.0%	7.7%	6.8%
Developing new routes for waste valorisation to biobased products and	7.5%	13.8%	10.7%
answered question	*67*	*130*	*197*

Figure SI.4: General overview of the responses within the category "Waste and by-products". The recommendations are grouped in their subthemes highlighted in yellow. For each individual recommendation, the percentage of respondents are shown that selected this recommendation. The results are shown for India and EU separately. In addition, also the total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

Detailed answers in function of the type of organisation:

Answer Options	India-tot (%)	INDIA-INDUSTRY (%)	INDIA-academic (%)	INDIA-Other (NGO, Gov, Oth) (%)
survey	46.3%	52.6%	48.6%	30.8%
Set up of a survey to assess the amount and type of waste dumped at landfills.	3.0%	5.3%	2.9%	0.0%
Assessment of the composition and the generation of MSW and the development of new	17.9%	36.8%	11.4%	7.7%
Set up of a survey of the generation and available agricultural and processing by-products	25.4%	10.5%	34.3%	23.1%
Improved collection and utilization of wastes	65.7%	73.7%	68.6%	46.2%
Development of technologies/methods to harvest, collect and use agricultural by-products,	38.8%	47.4%	34.3%	38.5%
Research to the better and maximum utilization of biowaste.	26.9%	26.3%	34.3%	7.7%
Development of new Technologies to convert existing (solid) waste	77.6%	68.4%	77.1%	92.3%
Development of technological routes to apply on existing agro-forestry waste, including	26.9%	21.1%	31.4%	23.1%
Development of technological routes to apply on existing municipal waste as feedstock for	29.9%	31.6%	22.9%	46.2%
Development of technological routes to apply on existing industrial waste as feedstock for	20.9%	15.8%	22.9%	23.1%
Research on wastewater treatment / bioremediation	38.8%	21.1%	37.1%	69.2%
Research on plants suitable for waste treatment and conversion.	13.4%	10.5%	11.4%	23.1%
Research on bioremediation, including bioremediation in sewage systems,and	25.4%	10.5%	25.7%	46.2%
Conversion of CO2	26.9%	36.8%	25.7%	15.4%
Development of new processes converting CO2 in bioenergy or biobased products.	26.9%	36.8%	25.7%	15.4%
Development of routes to convert wastes to a platform system for bioenergy and biobased	23.9%	36.8%	20.0%	15.4%
Development of improved and safer conversion processes of wastes (including pretreatment	10.4%	21.1%	5.7%	7.7%
Development of new routes for waste valorisation biobased products through Volatile Fatty	6.0%	5.3%	8.6%	0.0%
Developing new routes for waste valorisation to biobased products and fuels using synthetic	7.5%	10.5%	5.7%	7.7%
answered question	67	19	35	13

Answer Options	EU-tot (%)	EU-INDUSTRY (%)	EU-academic (%)	EU-Other (NGO, Gov, Oth) (%)
survey	58.5%	66.0%	52.4%	58.8%
Set up of a survey to assess the amount and type of waste dumped at landfills.	10.8%	16.0%	7.9%	5.9%
Assessment of the composition and the generation of MSW and the development of new	17.7%	16.0%	17.5%	23.5%
Set up of a survey of the generation and available agricultural and processing by-products	30.0%	34.0%	27.0%	29.4%
Improved collection and utilization of wastes	68.5%	72.0%	66.7%	64.7%
Development of technologies/methods to harvest, collect and use agricultural by-products,	38.5%	42.0%	38.1%	29.4%
Research to the better and maximum utilization of biowaste.	30.0%	30.0%	28.6%	35.3%
Development of new Technologies to convert existing (solid) waste	72.3%	68.0%	74.6%	88.2%
Development of technological routes to apply on existing agro-forestry waste, including	30.0%	18.0%	38.1%	29.4%
Development of technological routes to apply on existing municipal waste as feedstock for	22.3%	30.0%	15.9%	35.3%
Development of technological routes to apply on existing industrial waste as feedstock for	20.0%	20.0%	20.6%	23.5%
Research on wastewater treatment / bioremediation	16.2%	10.0%	20.6%	17.6%
Research on plants suitable for waste treatment and conversion.	7.7%	4.0%	11.1%	5.9%
Research on bioremediation, including bioremediation in sewage systems,and	8.5%	6.0%	9.5%	11.8%
Conversion of CO2	28.5%	36.0%	22.2%	29.4%
Development of new processes converting CO2 in bioenergy or biobased products.	28.5%	36.0%	22.2%	29.4%
Development of routes to convert wastes to a platform system for bioenergy and biobased	43.8%	38.0%	47.6%	47.1%
Development of improved and safer conversion processes of wastes (including	22.3%	22.0%	22.2%	23.5%
Development of new routes for waste valorisation biobased products through Volatile Fatty	7.7%	6.0%	11.1%	0.0%
Developing new routes for waste valorisation to biobased products and fuels using	13.8%	10.0%	14.3%	23.5%
answered question	130	50	63	17

Figure SI.5: Detailed overview of the responses within the category “Waste and by-products” per type of organization. The recommendations are grouped in subthemes highlighted in yellow. For each individual recommendation as well as type of organization, the percentage of respondents are shown that selected this recommendation. The results are shown in separate tables for India (top) and EU (bottom). The total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

3. Biorefinery

Total India:

- 65 respondents
- 190 responses

Total EU:

- 129 respondents
- 372 responses

Overall comparison:

Answer Options	INDIA-tot (%)	EU-tot (%)	average
Demonstration	50.8%	47.3%	49.0%
Set up of demo-biorefinery systems (low volume-high value/high volume-	15.4%	8.5%	12.0%
Set up of integrated demo biorefinery systems (ethanol, sugar, power, ...).	24.6%	20.9%	22.8%
Demonstration of small decentralized biomass densification	10.8%	17.8%	14.3%
Smart equipment	12.3%	10.9%	11.6%
Development of smart processing equipment.	12.3%	10.9%	11.6%
New biorefinery systems	26.2%	23.3%	24.7%
Development of new routes for producing biochemicals based on	10.8%	8.5%	9.6%
Development of new routes for producing biochemicals from Protein-	10.8%	7.8%	9.3%
Development of a biorefinery leading to inorganics as silica, K, Ca,	4.6%	7.0%	5.8%
Thermochemical systems	23.1%	31.0%	27.0%
Creating more efficient approaches by combining thermochemcial and	13.8%	13.2%	13.5%
Development of a pyrolysis oil platform for producing advanced biofuels	7.7%	7.0%	7.3%
Development of a combined process based on pyrolysis and	1.5%	10.9%	6.2%
Biorefinery based on lignocellulosic resources towards fuels and	92.3%	85.3%	88.8%
Development and utilization of smart enzyme systems for simultaneously	20.0%	12.4%	16.2%
Development, utilization and economical assessment of more active,	10.8%	9.3%	10.0%
Research and development of yeasts that can produce cellulases and	16.9%	9.3%	13.1%
Development of conversion methodologies for lignin towards	10.8%	11.6%	11.2%
Research and demonstration on process intensification to achieve more	16.9%	20.2%	18.5%
Development of biorefinery systems based on fast growing and/or easily	16.9%	22.5%	19.7%
Biorefinery based on oils towards fuels and chemicals	4.6%	10.9%	7.7%
New methodologies for producing and refining non-food plant oils	4.6%	7.0%	5.8%
Development of a full oleochemistry platform, including phytosterols,	0.0%	3.9%	1.9%
Biorefinery based on gases (CO2/methane) towards fuels and chemicals	6.2%	4.7%	5.4%
Research on fermentations using gas as a feedstock to produce biofuels	6.2%	4.7%	5.4%
Anaerobic digestion	76.9%	75.2%	76.1%
Research and developments to improve the overall efficiencies and	9.2%	8.5%	8.9%
Development of strategies for multi-feedstock anaerobic digestion of	24.6%	14.7%	19.7%
Development of a multiple-product approach for anaerobic digestion	7.7%	10.9%	9.3%
Development of easy-to-operate and inexpensive anaerobic digesters	9.2%	14.0%	11.6%
Research on the microbiology of AD for different feedstocks, including	6.2%	2.3%	4.2%
Research on the required upgrading, storage and logistics of biogas in	3.1%	5.4%	4.3%
Research on the use of digestate such as fertilizer substitute or fibres.	6.2%	10.9%	8.5%
Research on the pre-treatment of biomass for gasification.	10.8%	8.5%	9.6%
answered question	**65**	**129**	**194**

Figure SI.6: General overview of the responses within the category "biorefineries". The recommendations are grouped in their subthemes highlighted in yellow. For each individual recommendation, the percentage of respondents are shown that selected this recommendation. The results are shown for India and EU separately. In addition, also the total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

Detailed answers in function of the type of organisation:

Answer Options	INDIA-tot (%)	INDIA-INDUSTRY(%)	INDIA-academic	INDIA-Other (NGO, Gov.
Demonstration	50.8%	52.6%	42.4%	69.2%
Set up of demo-biorefinery systems (low volume-high value/high volume-low value).	15.4%	10.5%	12.1%	30.8%
Set up of integrated demo biorefinery systems (ethanol, sugar, power, ...).	24.6%	36.8%	15.2%	30.8%
Demonstration of small decentralized biomass densification programmes.	10.8%	5.3%	15.2%	7.7%
Smart equipment	12.3%	5.3%	21.2%	0.0%
Development of smart processing equipment.	12.3%	5.3%	21.2%	0.0%
New biorefinery systems	26.2%	21.1%	21.2%	46.2%
Development of new routes for producing biochemicals based on Furfural-based chemistry.	10.8%	5.3%	12.1%	15.4%
Development of new routes for producing biochemicals from Protein-based resources.	10.8%	15.8%	3.0%	23.1%
Development of a biorefinery leading to inorganics as silica, K, Ca, nutrients, ..	4.6%	0.0%	6.1%	7.7%
Thermochemical systems	23.1%	21.1%	24.2%	23.1%
Creating more efficient approaches by combining thermochemcial and biochemical conversion pathways	13.8%	10.5%	15.2%	15.4%
Development of a pyrolysis oil platform for producing advanced biofuels and biochemicals.	7.7%	10.5%	9.1%	0.0%
Development of a combined process based on pyrolysis and gasification for producing advanced	1.5%	0.0%	0.0%	7.7%
Biorefinery based on lignocellulosic resources towards fuels and chemicals	92.3%	100.0%	84.8%	53.8%
Development and utilization of smart enzyme systems for simultaneously conversion of cellulose and	20.0%	26.3%	24.2%	0.0%
Development, utilization and economical assessment of more active, cheaper enzymes for hydrolysis of	10.8%	5.3%	12.1%	15.4%
Research and development of yeasts that can produce cellulases and convert sugars in a range of	16.9%	15.8%	21.2%	7.7%
Development of conversion methodologies for lignin towards bioaromatics through biological, chemical	10.8%	15.8%	3.0%	23.1%
Research and demonstration on process intensification to achieve more cost-competitive lignocellulosic	16.9%	15.8%	24.2%	0.0%
Development of biorefinery systems based on fast growing and/or easily available biomass resources	16.9%	21.1%	0.0%	7.7%
Biorefinery based on oils towards fuels and chemicals	4.6%	0.0%	6.1%	7.7%
New methodologies for producing and refining non-food plant oils (aviation sector).	4.6%	0.0%	6.1%	7.7%
Development of a full oleochemistry platform, including phytosterols, tocopherols, carotenoids sterols etc.	0.0%	0.0%	0.0%	0.0%
Biorefinery based on gases (CO2/methane) towards fuels and chemicals	6.2%	21.1%	0.0%	0.0%
Research on fermentations using gas as a feedstock to produce biofuels and biochemical.	6.2%	21.1%	0.0%	0.0%
Anaerobic digestion	76.9%	73.7%	75.8%	84.6%
Research and developments to improve the overall efficiencies and reduction of costs of anaerobic	9.2%	21.1%	3.0%	7.7%
Development of strategies for multi-feedstock anaerobic digestion of various types of waste, including	24.6%	31.6%	24.2%	15.4%
Development of a multiple-product approach for anaerobic digestion (hydrogen, VFA, digestate) for	7.7%	5.3%	6.1%	15.4%
Development of easy-to-operate and inexpensive anaerobic digesters and their application	9.2%	5.3%	9.1%	15.4%
Research on the microbiology of AD for different feedstocks, including pre-treatment (e.g. separate	6.2%	0.0%	12.1%	0.0%
Research on the required upgrading, storage and logistics of biogas in relation to its application, such as	3.1%	0.0%	3.0%	7.7%
Research on the use of digestate such as fertilizer substitute or fibres.	6.2%	5.3%	3.0%	15.4%
Research on the pre-treatment of biomass for gasification.	10.8%	5.3%	15.2%	7.7%
answered question	**65**	**19**	**33**	**13**

Answer Options	EU-tot (%)	EU-INDUSTRY (%)	EU-academic (%)	EU-Other (NGO, Gov, Oth) (%)
Demonstration	47.3%	51.0%	41.9%	55.6%
Set up of demo-biorefinery systems (low volume-high	8.5%	8.2%	4.8%	22.2%
Set up of integrated demo biorefinery systems (ethanol, sugar,	20.9%	20.4%	22.6%	16.7%
Demonstration of small decentralized biomass densification	17.8%	22.4%	14.5%	16.7%
Smart equipment	10.9%	12.2%	12.9%	0.0%
Development of smart processing equipment.	10.9%	12.2%	12.9%	0.0%
New biorefinery systems	23.3%	32.7%	16.1%	22.2%
Development of new routes for producing biochemicals based	8.5%	8.2%	8.1%	11.1%
Development of new routes for producing biochemicals from	7.8%	8.2%	8.1%	5.6%
Development of a biorefinery leading to inorganics as silica, K,	7.0%	16.3%	0.0%	5.6%
Thermochemical systems	31.0%	36.7%	30.6%	16.7%
Creating more efficient approaches by combining	13.2%	20.4%	8.1%	11.1%
Development of a pyrolysis oil platform for producing advanced	7.0%	8.2%	8.1%	0.0%
Development of a combined process based on pyrolysis and	10.9%	8.2%	14.5%	5.6%
Biorefinery based on lignocellulosic resources towards fuels	85.3%	61.2%	104.8%	83.3%
Development and utilization of smart enzyme systems for	12.4%	8.2%	14.5%	16.7%
Development, utilization and economical assessment of more	9.3%	6.1%	12.9%	5.6%
Research and development of yeasts that can produce	9.3%	14.3%	6.5%	5.6%
Development of conversion methodologies for lignin towards	11.6%	6.1%	16.1%	11.1%
Research and demonstration on process intensification to	20.2%	14.3%	24.2%	22.2%
Development of biorefinery systems based on fast growing	22.5%	12.2%	30.6%	22.2%
Biorefinery based on oils towards fuels and chemicals	10.9%	12.2%	8.1%	16.7%
New methodologies for producing and refining non-food plant	7.0%	6.1%	6.5%	11.1%
Development of a full oleochemistry platform, including	3.9%	6.1%	1.6%	5.6%
Biorefinery based on gases (CO2/methane) towards fuels and	4.7%	6.1%	1.6%	11.1%
Research on fermentations using gas as a feedstock to	4.7%	6.1%	1.6%	11.1%
Anaerobic digestion	75.2%	69.4%	75.8%	88.9%
Research and developments to improve the overall efficiencies	8.5%	4.1%	11.3%	11.1%
Development of strategies for multi-feedstock anaerobic	14.7%	20.4%	11.3%	11.1%
Development of a multiple-product approach for anaerobic	10.9%	10.2%	12.9%	5.6%
Development of easy-to-operate and inexpensive anaerobic	14.0%	16.3%	9.7%	22.2%
Research on the microbiology of AD for different feedstocks,	2.3%	0.0%	4.8%	0.0%
Research on the required upgrading, storage and logistics of	5.4%	4.1%	6.5%	5.6%
Research on the use of digestate such as fertilizer substitute or	10.9%	4.1%	14.5%	16.7%
Research on the pre-treatment of biomass for gasification.	8.5%	10.2%	4.8%	16.7%
answered question	**129**	**49**	**62**	**18**

Figure SI.7: Detailed overview of the responses within the category “Biorefineries” per type of organization. The recommendations are grouped in subthemes highlighted in yellow. For each individual recommendation as well as type of organization, the percentage of respondents are shown that selected this recommendation. The results are shown in separate tables for India (top) and EU (bottom). The total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

4. Policy, Market and Products

Total India:

- 64 respondents
- 187 responses

Total EU:

- 130 respondents
- 374 responses

Overall comparison:

Answer Options	INDIA-total	EU-total	Average
Assessment of the present agricultural and biological waste categories that can	48.4%	22.5%	35.5%
Reduction of pre-and post-harvest losses and improved supply chain	17.2%	19.4%	18.3%
Stimulation of the zero waste production systems.	12.5%	31.8%	22.1%
Capacity building of farmers both at EU and India levels. In particular providing	15.6%	14.7%	15.2%
Improved LCA methods.	18.8%	18.6%	18.7%
Agreement on the sustainable production and the use of biomass for the	31.3%	32.6%	31.9%
Public procurement of biobased products.	15.6%	13.2%	14.4%
Develop standards for biobased products.	15.6%	24.0%	19.8%
Have agreement on GHG reduction performance of biobased products and	9.4%	15.5%	12.4%
Joint EU-IN study on markets; biobased polymers, aromats, fibres and other	18.8%	13.2%	16.0%
Research into development of performance criteria of biobased products, GHG	15.6%	14.0%	14.8%
Research for creating a level playing field for biobased products and energy	4.7%	10.1%	7.4%
Research into sustainability limitations and opportunities of biomass production	21.9%	18.6%	20.2%
Create awareness on ecology, environment, biobased economy at primary and	25.0%	24.8%	24.9%
Provide training and improve skills in agriculture and industry.	21.9%	20.9%	21.4%
answered question	***64***	***118***	***182***

Figure SI.8: General overview of the responses within the category "Policy, market and products". The recommendations are grouped in their subthemes highlighted in yellow. For each individual recommendation, the percentage of respondents are shown that selected this recommendation. The results are shown for India and EU separately. In addition also the total result of each subtheme is shown. As each respondent could select three recommendations, the total approximates 300%.

5. Comparison of responses from the EU and India

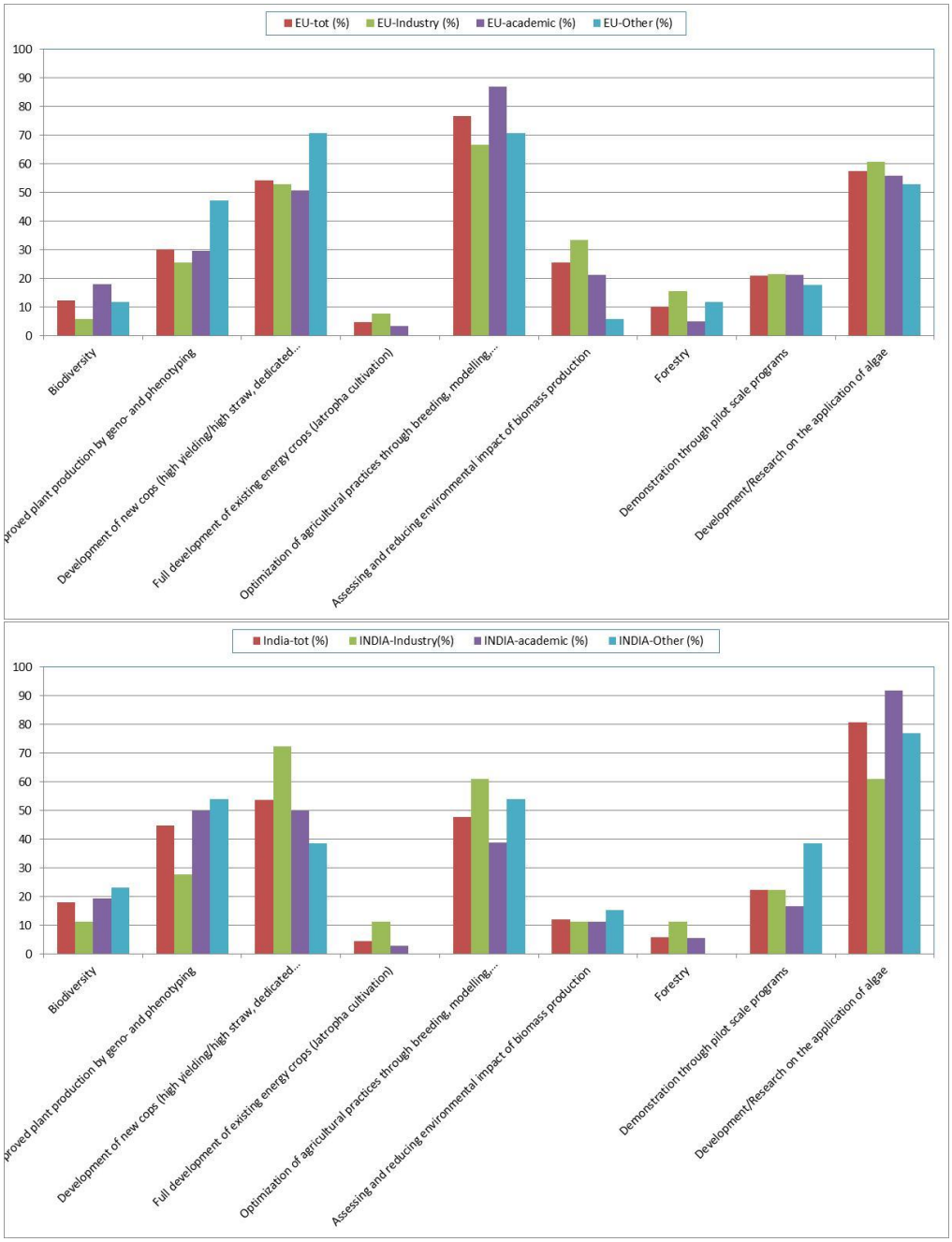

Figure SI.9: Comparison of responses to feedstock related survey questions by industry, academic and other sectors in EU (top) and India (bottom).

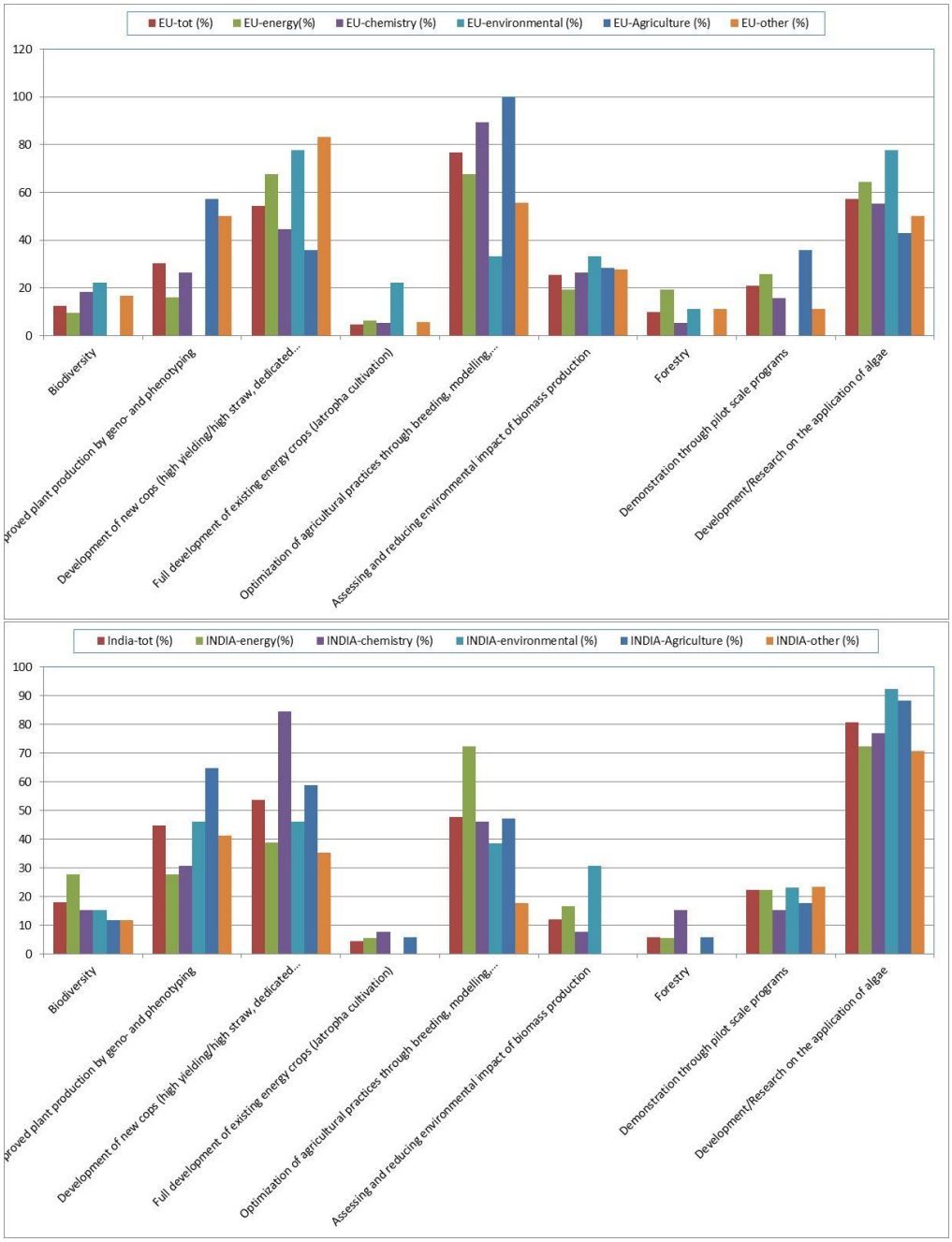

Figure SI.10: Comparison of responses to feedstock related survey questions by different organizations in EU (top) and India (bottom).

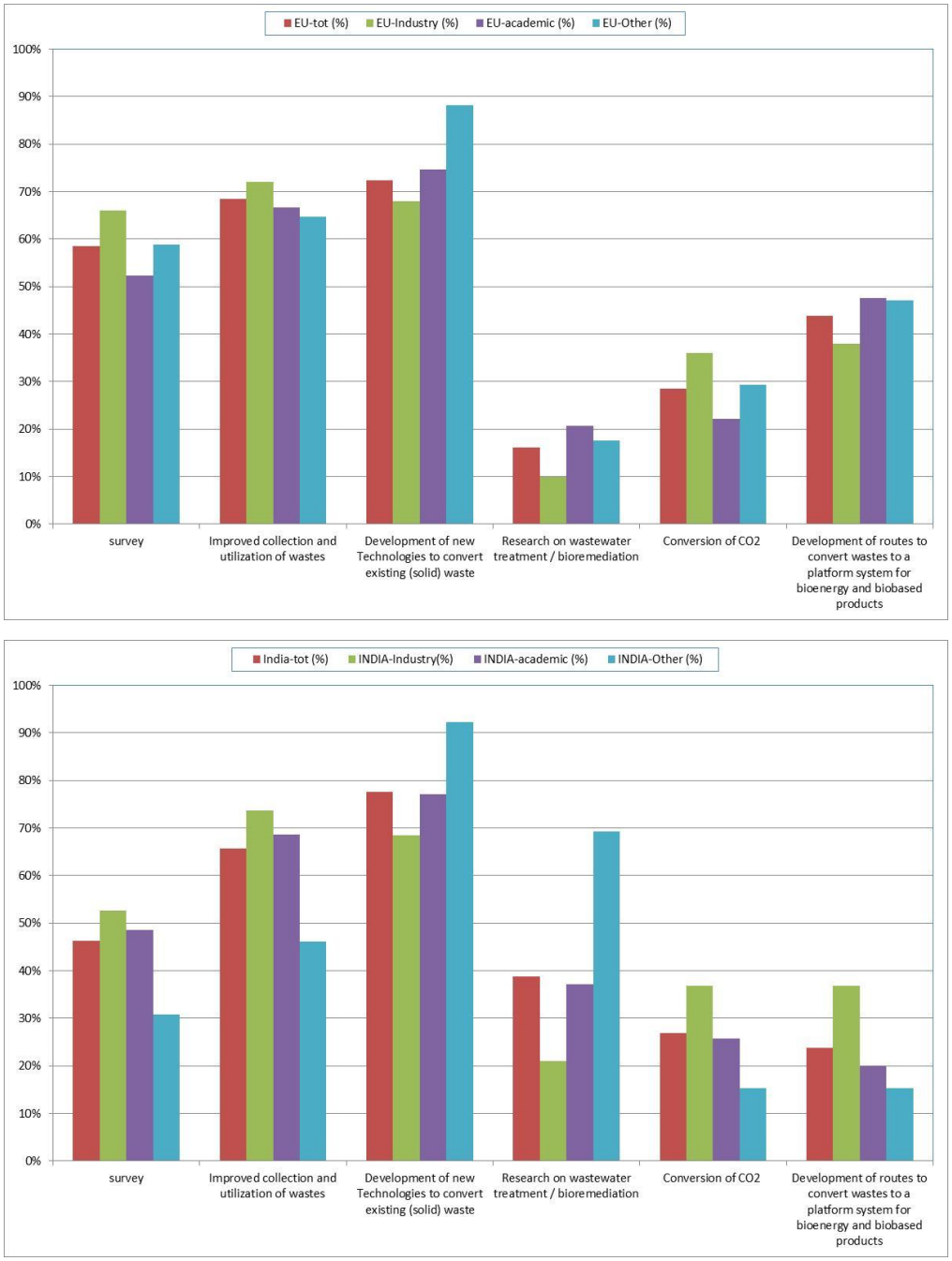

Figure SI.11: Comparison of responses to waste related survey questions by industry, academic and other sectors in EU (top) and India (bottom).

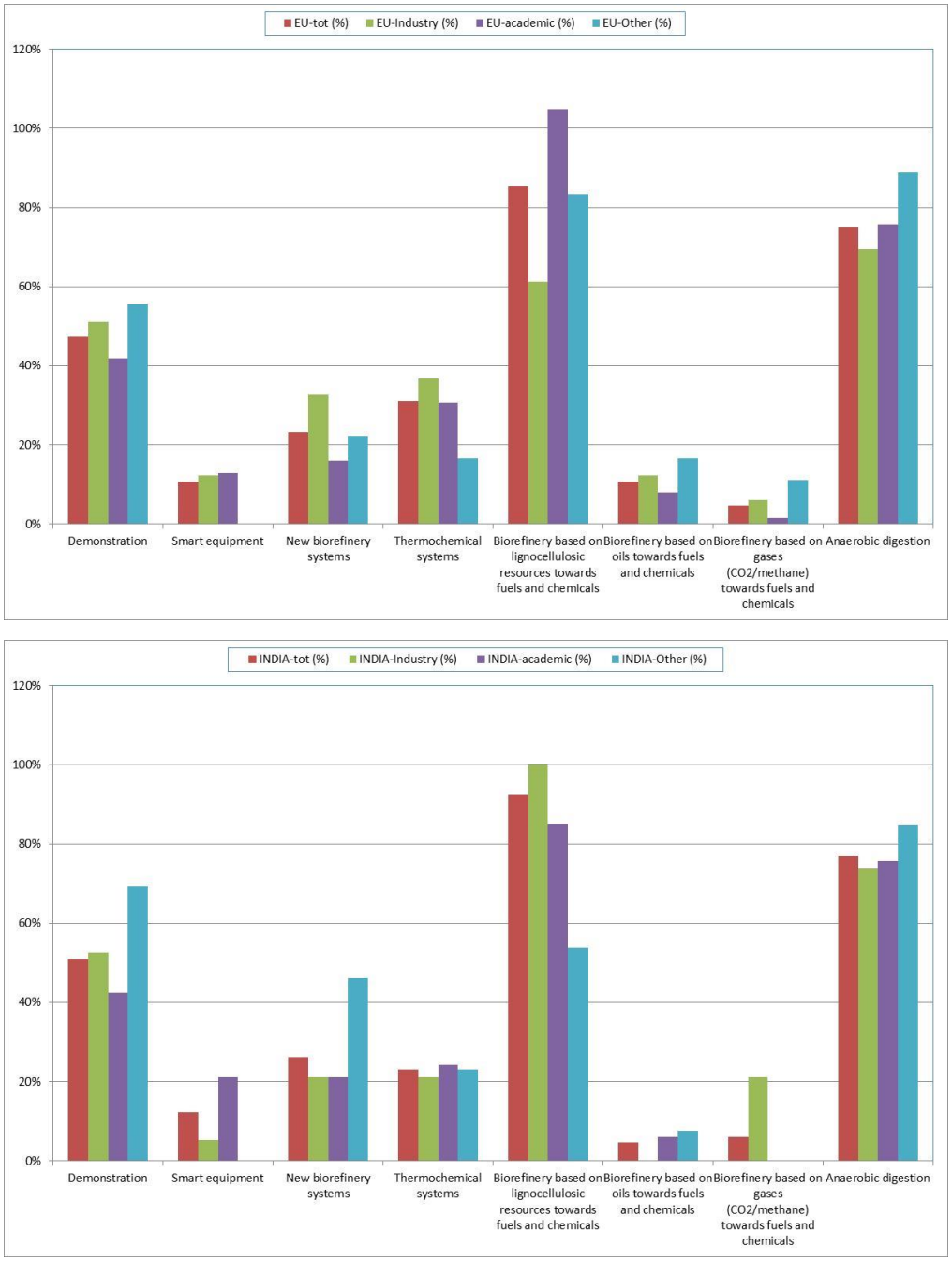

Figure SI.12: Comparison of responses to biorefinery related survey questions by industry, academic and other sectors in EU (top) and India (bottom).