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10. Background data

Table 15: Biofuels in Tj – source materials¹

| Fuel type/ Quota Source material | Bioethanol | | | Biomethane | | | Bt-FTD | | | FAME | | | HVO | | | CP-HVO | | | Vegetable oil | | | |
|---|---------------|---------------|---------------|--------------|--------------|--------------|--------|----------|------|---------------|---------------|---------------|--------------|--------------|--------------|--------|------|-----------|---------------|-----------|-----------|----|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | |
| Wastes/residues | 46 | 419 | 698 | 1,615 | 1,329 | 736 | | | | 31,508 | 41,144 | 33,139 | 80 | 77 | 24 | | | | | | | |
| Ethiopian mustard | | | | | | | | | | | 52 | 98 | | | | | | | | | | |
| Barley | 1,665 | 1,326 | 424 | | | | | | | | | | | | | | | | | | | |
| Maize | 14,369 | 15,484 | 19,623 | | | | | | | | | | | | | | | | | | | |
| Palm oil | | | | | | | | | | 18,373 | 17,790 | 22,523 | 1,361 | 1,106 | 1,812 | | | | 65 | 5 | 19 | |
| Rapeseed | | | | | | | | | | 28,381 | 25,105 | 29,600 | | | | | | | | 26 | 19 | 18 |
| Rye | 2,272 | 1,439 | 1,148 | | | | | | | | | | | | | | | | | | | |
| Silage maize | | | | | 80 | 491 | | | | | | | | | | | | | | | | |
| Soy | | | | | | | | | | 62 | 675 | 1,215 | | | | | | | | | | |
| Sunflower | | | | | | | | | | 1,631 | 1,898 | 3,073 | | | | | | | | | | |
| Triticale | 1,753 | 1,956 | 1,493 | | | | | | | | | | | | | | | | | | | |
| Wheat | 7,940 | 8,622 | 5,394 | | | | | | | | | | | | | | | | | | | |
| Sugar cane | 1,071 | 498 | 1,426 | | | | | | | | | | | | | | | | | | | |
| Sugar beet | 875 | 1,042 | 603 | | | | | | | | | | | | | | | | | | | |
| Total | 29,991 | 30,785 | 30,808 | 1,615 | 1,408 | 1,227 | | 3 | | 79,955 | 86,663 | 89,646 | 1,442 | 1,184 | 1,836 | | | 65 | 26 | 24 | 37 | |

¹ Differences in totals are due to rounding

Table 16: Biofuels in kt - source materials^{1,2}

| Fuel type/ Quota year | Bioethanol | | | Biomethane | | | Bt-FTD | | | FAME | | | HVO | | | CP-HVO | | | Vegetable oil | | |
|-----------------------------|------------|-------|-------|------------|------|------|--------|------|------|-------|-------|-------|------|------|------|--------|------|------|---------------|------|------|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| Source material | 2 | 16 | 26 | 32 | 27 | 15 | 0.1 | | | 843 | 1,101 | 887 | 2 | 2 | 1 | | | | | | |
| Wastes/residues | | | | | | | | | | | | | | | | | | | | | |
| Ethiopian mustard | | | | | | | | | | | 1 | 3 | | | | | | | | | |
| Barley | 63 | 50 | 16 | | | | | | | | | | | | | | | | | | |
| Maize | 543 | 585 | 741 | | | | | | | | | | | | | | | | | | |
| Palm oil | | | | | | | | | | 492 | 476 | 603 | 31 | 25 | 42 | | | | 1 | 0.1 | 1 |
| Rapeseed | | | | | | | | | | 759 | 672 | 792 | | | | | | | | 1 | 1 |
| Rye | 86 | 54 | 43 | | | | | | | | | | | | | | | | | | |
| Silage maize | | | | | 2 | 10 | | | | | | | | | | | | | | | |
| Soy | | | | | | | | | | 2 | 18 | 32 | | | | | | | | | |
| Sunflower | | | | | | | | | | 44 | 51 | 82 | | | | | | | | | |
| Triticale | 66 | 74 | 56 | | | | | | | | | | | | | | | | | | |
| Wheat | 300 | 326 | 204 | | | | | | | | | | | | | | | | | | |
| Sugar cane | 40 | 19 | 54 | | | | | | | | | | | | | | | | | | |
| Sugar beet | 33 | 39 | 23 | | | | | | | | | | | | | | | | | | |
| Total | 1,133 | 1,163 | 1,164 | 32 | 28 | 25 | 0.1 | | | 2,140 | 2,319 | 2,399 | 33 | 27 | 42 | | | | 1 | 1 | 1 |

¹ Differences in totals are due to rounding² Conversion to tonnage is based on the quantity indications from certificates.

Table 17: Biofuels in T1 – source materials and their origin¹

| Region/ Quota year | Africa | | | Asia | | | Australia | | | Europe | | | Central America | | | North America | | | South America | | | |
|--------------------------|--------|------|------|--------|--------|--------|-----------|-------|-------|--------|--------|--------|-----------------|-------|-------|---------------|-------|------|---------------|-------|-------|-------|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | |
| Source material | | | | | | | | | | | | | | | | | | | | | | |
| Wastes/residues | 287 | 391 | 174 | 6,947 | 12,180 | 13,122 | 46 | 84 | 18 | 23,412 | 27,096 | 19,924 | 11 | 14 | 11 | 1,983 | 2,682 | 969 | 562 | 523 | 379 | |
| Ethiopian mustard | | | | | | | | | | | | | | | | | | | 9 | | 52 | 89 |
| Barley | | | | | | | | | | 1,665 | 1,326 | 424 | | | | | | | | | | |
| Maize | | 9 | | | | | | | | 14,369 | 15,475 | 19,607 | | | | | | 15 | | | | |
| Palm oil | | | | 17,464 | 17,867 | 21,409 | | | | | | | 2,270 | 1,029 | 2,970 | | | | | 5 | 39 | |
| Rapeseed | | | | | 17 | 71 | 333 | 3,104 | 5,014 | 28,075 | 22,002 | 24,533 | | | | | | | | | | |
| Rye | | | | | | | | | | 2,272 | 1,439 | 1,148 | | | | | | | | | | |
| Silage maize | | | | | | | | | | | 80 | 491 | | | | | | | | | | |
| Soy | | | | | | | | 10 | | 35 | 19 | 27 | | | | | | | | 27 | 646 | 1,188 |
| Sunflower | | | | | | | | | | 1,631 | 1,898 | 3,073 | | | | | | | | | | |
| Triticale | | | | | | | | | | 1,753 | 1,956 | 1,493 | | | | | | | | | | |
| Wheat | | | | | | | | | | 7,940 | 8,622 | 5,394 | | | | | | | | | | |
| Sugar cane | | | | | | | | | | | | | 324 | 247 | 350 | | | | 746 | 251 | 1,076 | |
| Sugar beet | | | | | | | | | | 875 | 1,042 | 603 | | | | | | | | | | |
| Total | 287 | 400 | 174 | 24,411 | 30,065 | 34,603 | 379 | 3,198 | 5,031 | 82,027 | 80,954 | 76,716 | 2,606 | 1,290 | 3,331 | 1,983 | 2,682 | 993 | 1,335 | 1,477 | 2,771 | |

¹ Differences in totals are due to rounding

Table 18: Biofuels in kt – source materials and their origin^{1,2}

| Region/ Quota year | Africa | | | Asia | | | Australia | | | Europe | | | Central America | | | North America | | | South America | | | |
|--------------------------|--------|------|------|------|------|------|-----------|------|------|--------|-------|-------|-----------------|------|------|---------------|------|------|---------------|------|------|--|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | |
| Source material | | | | | | | | | | | | | | | | | | | | | | |
| Wastes/residues | 8 | 10 | 5 | 186 | 326 | 351 | 1 | 2 | 0.5 | 616 | 721 | 536 | 0.3 | 0.4 | | 53 | 72 | 26 | 15 | 14 | 10 | |
| Ethiopian mus- tard | | | | | | | | | | | | | | | | | | 0.2 | | | | |
| Barley | | | | | | | | | | 63 | 50 | 16 | | | | | | | | | | |
| Maize | | 0.3 | | | | | | | | 543 | 585 | 741 | | | 79 | | | 1 | | | | |
| Palm oil | | | | 462 | 474 | 566 | | | | 751 | 589 | 656 | 61 | 28 | | | | | | 0.1 | 1 | |
| Rapeseed | | | | | 1 | 2 | 9 | 83 | 134 | | | | | | | | | | | | | |
| Rye | | | | | | | | | | 86 | 54 | 43 | | | | | | | | | | |
| Silage maize | | | | | | | | | | | 2 | 10 | | | | | | | | | | |
| Soy | | | | | | | | 0.3 | | 1 | 1 | 1 | | | | | | | 1 | 17 | 32 | |
| Sunflower | | | | | | | | | | 44 | 51 | 82 | | | | | | | | | | |
| Triticale | | | | | | | | | | 66 | 74 | 56 | | | | | | | | | | |
| Wheat | | | | | | | | | | 300 | 326 | 204 | | | 13 | | | | | | | |
| Sugar cane | | | | | | | | | | | | | 12 | 9 | | | | | 28 | 9 | 41 | |
| Sugar beet | | | | | | | | | | | 33 | 39 | 23 | | | | | | | | | |
| Total | 8 | 11 | 5 | 648 | 800 | 919 | 10 | 86 | 135 | 2,503 | 2,490 | 2,368 | 73 | 37 | 124 | 53 | 72 | 27 | 44 | 42 | 86 | |

¹ Differences in totals are due to rounding

² Conversion to tonnage is based on the quantity indications from certificates.

Table 19: Total biofuels per source material¹

| Source material | 2017 [TJ] | 2018 [TJ] | 2019 [TJ] | 2017 [kt] | 2018 [kt] | 2019 [kt] |
|-------------------|----------------|----------------|----------------|--------------|--------------|--------------|
| Wastes/residues | 33,249 | 42,971 | 34,598 | 879 | 1,145 | 928 |
| Ethiopian mustard | | 52 | 98 | | 1 | 3 |
| Barley | 1,665 | 1,326 | 424 | 63 | 50 | 16 |
| Maize | 14,369 | 15,484 | 19,623 | 543 | 585 | 741 |
| Palm oil | 19,734 | 18,901 | 24,418 | 523 | 502 | 646 |
| Rapeseed | 28,408 | 25,124 | 29,618 | 760 | 672 | 793 |
| Rye | 2,272 | 1,439 | 1,148 | 86 | 54 | 43 |
| Silage maize | | 80 | 491 | | 2 | 10 |
| Soy | 62 | 675 | 1,215 | 2 | 18 | 32 |
| Sunflower | 1,631 | 1,898 | 3,073 | 44 | 51 | 82 |
| Triticale | 1,753 | 1,956 | 1,493 | 66 | 74 | 56 |
| Wheat | 7,940 | 8,622 | 5,394 | 300 | 326 | 204 |
| Sugar cane | 1,071 | 498 | 1,426 | 40 | 19 | 54 |
| Sugar beet | 875 | 1,042 | 603 | 33 | 39 | 23 |
| Total | 113,029 | 120,066 | 123,619 | 3,339 | 3,538 | 3,632 |

¹ Differences in totals are due to rounding

Table 20: Biofuels whose source materials originate in Germany [TJ]¹

| Fuel type/ Quota year | Bioethanol | | | Biomethane | | | FAME | | | Vegetable oil | | | Total | | |
|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|-----------|-----------|---------------|---------------|---------------|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| Source material | | | | | | | | | | | | | | | |
| Wastes/residues | 0.1 | 124 | 220 | 1,602 | 1,316 | 736 | 6,360 | 8,186 | 6,275 | | | | 7,962 | 9,626 | 7,231 |
| Barley | 1,468 | 1,234 | 367 | | | | | | | | | | 1,468 | 1,234 | 367 |
| Maize | 71 | 247 | 264 | | | | | | | | | | 71 | 247 | 264 |
| Rapeseed | | | | | | | 14,738 | 12,187 | 13,812 | 26 | 19 | 18 | 14,764 | 12,206 | 13,830 |
| Rye | 1,513 | 432 | 470 | | | | | | | | | | 1,513 | 432 | 470 |
| Silage maize | | | | | 80 | 491 | | | | | | | | 80 | 491 |
| Sunflower | | | | | | | | 4 | | | | | | 4 | |
| Triticale | 404 | 459 | 271 | | | | | | | | | | 404 | 459 | 271 |
| Wheat | 1,327 | 1,519 | 392 | | | | | | | | | | 1,327 | 1,519 | 392 |
| Sugar beet | 635 | 585 | 468 | | | | | | | | | | 635 | 585 | 468 |
| Total | 5,418 | 4,601 | 2,452 | 1,602 | 1,396 | 1,227 | 21,098 | 20,377 | 20,087 | 26 | 19 | 18 | 28,144 | 26,392 | 23,784 |

¹ Differences in totals are due to rounding

Table 21: Biofuels from wastes and residues [T]¹

| 'Advanced biofuels' pursuant to 38th BImSchV, Annex 1 no. | 2017 | 2018 | 2019 |
|---|---------------|---------------|---------------|
| 3 (organic waste) | 86 | 191 | 106 |
| 4 (share of biomass in industrial waste) | 58 | 53 | 476 |
| 5 (straw) | 0.2 | | |
| 6 (animal manure and sewage sludge) | 3 | | |
| 7 (palm oil mill effluent and empty palm fruit bunches) | 80 | 51 | 1 |
| 8 (tall oil pitch) | 3 | | |
| 9 (crude glycerine) | | 0.3 | 36 |
| 11 (grape marc and wine lees) | 6 | 1 | 0.3 |
| 16 (other non-food materials containing cellulose) | | 53 | 129 |
| Subtotal for advanced biofuels | 237 | 350 | 748 |
| Non-advanced biofuels from wastes and residues | 33,012 | 42,621 | 33,849 |
| Used cooking oils | 27,045 | 35,192 | 27,206 |
| Other | 5,967 | 7,429 | 6,644 |
| Total wastes and residues | 33,249 | 42,971 | 34,598 |

¹ Differences in totals are due to rounding

Table 22: Emissions and emission savings of biofuels¹

| Biofuel type | Emissions 2017 | Emissions 2018 | Emissions 2019 | Savings 2017 | Savings 2018 | Savings 2019 |
|----------------------------------|---------------------------|---------------------------|---------------------------|--------------|--------------|--------------|
| | [t CO ₂ eq/TJ] | [t CO ₂ eq/TJ] | [t CO ₂ eq/TJ] | [%] | [%] | [%] |
| Bioethanol | 14.58 | 12.69 | 11.04 | 82.60 | 86.40 | 88.16 |
| Biomethane | 7.77 | 9.19 | 10.12 | 90.73 | 90.23 | 89.24 |
| BtI-FTD | | 8.30 | | | 91.27 | |
| FAME | 16.10 | 16.26 | 18.37 | 80.79 | 82.90 | 80.68 |
| HVO | 29.64 | 21.93 | 19.45 | 64.64 | 76.94 | 79.55 |
| CP-HVO | | | 20.43 | | | 78.52 |
| Vegetable oil | 30.09 | 30.18 | 25.90 | 64.09 | 68.26 | 72.77 |
| Weighted average of all biofuels | 15.75 | 15.32 | 16.48 | 81.20 | 83.81 | 82.59 |

¹ Saving compared with fossil fuel reference value (cf. Fehler! Verweisquelle konnte nicht gefunden werden., page 61)

Table 23: Types of bioliquids [TJ]¹

| Type of bioliquid | 2017 | 2018 | 2019 |
|---|---------------|---------------|---------------|
| From pulp industry | 27,279 | 25,700 | 27,597 |
| FAME | 829 | 1,256 | 1,069 |
| HVO | 30 | | |
| Vegetable oil | 3,149 | 3,432 | 4,259 |
| Total Fehler! Verweisquelle konnte nicht gefunden werden., p. Fehler! Textmarke nicht definiert. | 31,287 | 30,388 | 32,925 |

Table 24: Bioliquid vegetable oil – source materials [TJ]¹

| Source material | 2017 | 2018 | 2019 |
|-----------------|--------------|--------------|--------------|
| Palm oil | 2,157 | 2,448 | 2,971 |
| Rapeseed | 992 | 824 | 1,142 |
| Shea | | 159 | 146 |
| Total | 3,149 | 3,432 | 4,259 |

Table 25: Bioliquid vegetable oils from palm oil – origin [TJ]¹

| Origin | 2017 | 2018 | 2019 |
|--------------|--------------|--------------|--------------|
| Guatemala | | | 15 |
| Honduras | 339 | 249 | 782 |
| Indonesia | 147 | 267 | 804 |
| Colombia | 8 | 419 | 192 |
| Malaysia | 1,663 | 1,512 | 1,178 |
| Total | 2,157 | 2,448 | 2,971 |

¹ Differences in totals are due to rounding

Table 26: Emissions and emission savings of bioliquids¹

| Type of bioliquid | Emissions 2017 | Emissions 2018 | Emissions 2019 | Savings 2017 | Savings 2018 | Savings 2019 |
|------------------------------------|---------------------------|---------------------------|---------------------------|--------------|--------------|--------------|
| | [t CO ₂ eq/TJ] | [t CO ₂ eq/TJ] | [t CO ₂ eq/TJ] | [%] | [%] | [%] |
| From pulp industry | 1.8 | 1.86 | 1.72 | 98.02 | 97.95 | 98.11 |
| FAME | 37.18 | 34.65 | 34.80 | 59.14 | 61.93 | 61.76 |
| HVO | 44.5 | | | 51.1 | | |
| Vegetable oil | 33.73 | 31.99 | 29.83 | 62.93 | 64.85 | 67.22 |
| Weighted average of all bioliquids | 5.99 | 6.62 | 6.43 | 93.41 | 92.73 | 92.94 |

¹ Savings compared with fossil fuel reference value of 91 g CO₂eq/MJ.

