sustainability

MDPI

Article

Supplementary Material

Current (2020) and Long-term (2035 and 2050) Sustainable Potentials of Wood Fuel in Switzerland

Matthias Erni [1,*], Vanessa Burg [1], Leo Bont [1], Oliver Thees [1], Marco Ferretti [1], Golo Stadelmann and Janine Schweier [1]

[1] Federal Institute for Forest, Snow and Landscape Research (WSL), Research Group Sustainable Forestry, Zürcherstrasse 111, CH-8903 Birmensdorf

* Correspondence: matthias.erni@wsl.ch, Tel.: +41-44-739-21-24

Received: 30.09.2020; Accepted: date; Published: date

Contents

Abbreviations

AS	Areal statistics
CSI	Continuous stock increase
EO-	Less energy-oriented wood market
EO+	Energy-oriented wood market
ESP	Ecologically sustainable potential
HeProMo	Harvesting productivity models
LSR	Large stock reduction
MASSIMO	Management scenario simulation model
MSR	Moderate stock reduction
NFI	National Forest Inventory
SP	Sustainable potential
TP	Theoretical potential

S1: Wood fuel from forests

S1 Table 1: Theoretical potential of wood fuel from forests in Switzerland in the years 2020, 2035 and 2050, in total and for broadleaves and conifers separately.

Year	Scenario	Wood type	[PJ a^{-1}]*			M [m^3 a^{-1}]		
			Minimum	Expected	Maximum	Minimum	Expected	Maximum
2020	CSI	Total	86.6	88.9	93.5	11.86	12.17	12.49
		Conifers	40.1	41.2	42.3	6.51	6.68	6.86
		Broadleaves	46.5	47.7	51.2	5.35	5.49	5.63
	MSR	Total	99.1	102.1	107.7	13.72	14.15	14.57
		Conifers	49.3	50.8	52.4	7.99	8.24	8.49
		Broadleaves	49.8	51.3	55.3	5.73	5.91	6.08
	LSR	Total	114.1	118.1	125.0	15.76	16.31	16.87
		Conifers	55.8	57.8	59.7	9.05	9.37	9.68
		Broadleaves	58.3	60.3	65.3	6.71	6.95	7.18
2035	CSI	Total	91.1	100.4	112.3	12.52	13.79	15.06
		Conifers	43.1	47.5	51.9	6.99	7.70	8.41
		Broadleaves	48.0	52.9	60.4	5.53	6.09	6.65
	MSR	Total	106.6	110.3	116.9	14.65	15.17	15.68
		Conifers	50.7	52.4	54.2	8.21	8.50	8.79
		Broadleaves	55.9	57.9	62.6	6.44	6.67	6.89
	LSR	Total	120.6	124.8	132.1	16.67	17.26	17.84
		Conifers	59.4	61.5	63.5	9.63	9.97	10.30
		Broadleaves	61.2	63.3	68.5	7.05	7.29	7.54
2050	CSI	Total	91.0	103.0	117.9	12.50	14.16	15.80
		Conifers	43.2	48.9	54.6	7.00	7.93	8.90
		Broadleaves	47.8	54.1	63.2	5.50	6.23	7.00
	MSR	Total	88.5	93.5	100.7	12.30	12.96	13.70
		Conifers	44.4	46.9	49.4	7.20	7.60	8.00
		Broadleaves	44.1	46.6	51.3	5.10	5.36	5.60
	LSR	Total	75.3	77.6	81.7	10.40	10.76	11.10
		Conifers	37.7	38.8	39.9	6.10	6.29	6.50
		Broadleaves	37.7	38.8	41.8	4.30	4.47	4.60

*primary energy

S1 Table 2: Sustainable potential of wood fuel from forests in Switzerland in the years 2020, 2035 and 2050 in Switzerland, in total and for broadleaves and conifers separately.

Time	Scenario	Wood type	[PJ a^{-1}]*			M [m^3 a^{-1}]		
			Minimum	Expected	Maximum	Minimum	Expected	Maximum
2020	CSI	Total	13.9	20.8	24.9	1.83	2.72	3.28
		Conifers	4.7	6.8	8.8	0.76	1.10	1.43
		Broadleaves	9.2	14.0	16.1	1.06	1.61	1.85
	MSR	Total	19.9	30.3	36.7	2.62	3.99	4.88
		Conifers	7.1	10.7	13.9	1.16	1.73	2.25
		Broadleaves	12.7	19.6	22.8	1.46	2.26	2.63
	LSR	Total	25.7	39.5	47.3	3.38	5.19	6.28
		Conifers	9.1	13.7	17.7	1.47	2.23	2.86
		Broadleaves	16.6	25.7	29.6	1.92	2.96	3.41
2035	CSI	Total	13.7	21.1	31.7	1.80	2.75	4.18
		Conifers	4.6	6.9	11.2	0.74	1.12	1.81
		Broadleaves	9.2	14.2	20.6	1.06	1.64	2.37
	MSR	Total	20.4	31.7	38.7	2.67	4.15	5.11
		Conifers	6.7	10.5	13.9	1.11	1.70	2.25
		Broadleaves	13.5	21.3	24.8	1.56	2.45	2.86
	LSR	Total	23.6	36.2	44.7	3.13	4.79	5.97
		Conifers	8.8	13.2	17.4	1.42	2.14	2.82
		Broadleaves	14.8	23.0	27.3	1.71	2.65	3.15
2050	CSI	Total	12.4	18.5	27.4	1.63	2.41	3.62
		Conifers	4.2	6.1	9.9	0.68	0.99	1.60
		Broadleaves	8.2	12.3	17.5	0.94	1.42	2.02
	MSR	Total	13.0	20.1	26.5	1.72	2.66	3.54
		Conifers	4.9	7.2	10.5	0.79	1.17	1.70
		Broadleaves	8.09	12.9	16.0	0.93	1.49	1.85
	LSR	Total	9.1	14.5	20.0	1.34	1.95	2.71
		Conifers	4.1	5.8	8.6	0.67	0.93	1.40
		Broadleaves	5.8	8.8	11.4	0.67	1.01	1.31

*primary energy

S1 Table 3: Ecologically sustainable potential (ESP, no costs considered) of wood fuel from forests in Switzerland in the years 2020, 2035 and 2050 in total and for broadleaves and conifers separately.

Time	Scenario	Wood type	[PJ a^{-1}]*			M [m^3 a^{-1}]		
			Minimum	Expected	Maximum	Minimum	Expected	Maximum
2020	CSI	Total	23.0	33.3	33.0	3.03	4.39	4.38
		Conifers	8.2	11.7	12.3	1.33	1.90	1.99
		Broadleaves	14.8	21.6	20.8	1.70	2.49	2.39
	MSR	Total	33.7	44.2	49.3	4.50	5.89	6.60
		Conifers	13.0	17.0	19.7	2.11	2.75	3.20
		Broadleaves	20.7	27.2	29.5	2.38	3.14	3.40
	LSR	Total	41.6	55.6	61.6	5.55	7.41	8.25
		Conifers	16.0	21.2	24.4	2.59	3.44	3.96
		Broadleaves	25.7	34.4	37.1	2.96	3.97	4.28
2035	CSI	Total	22.7	33.9	41.9	2.99	4.45	5.54
		Conifers	7.8	11.6	15.1	1.27	1.88	2.46
		Broadleaves	14.9	22.2	26.8	1.72	2.56	3.09
	MSR	Total	35.1	46.4	51.9	4.64	6.13	6.89
		Conifers	12.6	16.6	19.5	2.04	2.69	3.16
		Broadleaves	22.5	29.8	32.4	2.59	3.44	3.73
	LSR	Total	41.1	54.1	60.2	5.47	7.21	8.08
		Conifers	15.8	20.8	24.2	2.55	3.37	3.92
		Broadleaves	25.3	33.3	36.1	2.92	3.83	4.16
2050	CSI	Total	21.7	29.0	37.2	2.86	3.81	4.93
		Conifers	7.7	10.0	13.9	1.25	1.62	2.25
		Broadleaves	14.0	19.0	23.3	1.61	2.19	2.68
	MSR	Total	25.2	32.6	38.1	3.36	4.33	5.13
		Conifers	9.9	12.3	15.7	1.60	1.99	2.54
		Broadleaves	15.3	20.3	22.5	1.76	2.34	2.59
	LSR	Total	22.7	27.3	32.3	3.05	3.65	4.37
		Conifers	9.4	10.8	14.0	1.52	1.75	2.27
		Broadleaves	13.3	16.5	18.2	1.53	1.90	2.10

*primary energy

S1 Table 4: Neglecting costs, the additional potential in [%] of wood fuel from forests in Switzerland in 2020, 2035 and 2050 in Switzerland, in total and for broadleaves and conifers separately. Difference between the ecologically sustainable potential (ESP, no costs considered) and the SP (considering costs as a restriction) of the CSI for all of the different forest management strategies (CSI, MSR, LSR).

Time	Scenario	Wood type	Additional Potential in [%] compared to the corresponding CSI		
			Minimum	Expected	Maximum
2020	CSI	Total	64.8	60.4	32.7
		Conifers	74.3	72.2	39.5
		Broadleaves	60.0	54.6	29.0
	MSR	Total	142.0	112.6	97.9
		Conifers	176.4	149.6	124.1
		Broadleaves	124.4	94.7	83.5
	LSR	Total	198.8	167.5	147.5
		Conifers	238.9	212.0	177.6
		Broadleaves	178.4	146.0	131.0
2035	CSI	Total	65.7	60.5	32.1
		Conifers	71.2	68.7	35.8
		Broadleaves	63.0	56.5	30.2
	MSR	Total	155.8	120.1	63.4
		Conifers	176.0	140.8	74.5
		Broadleaves	145.8	110.1	57.5
	LSR	Total	199.4	156.4	89.8
		Conifers	245.0	202.1	116.7
		Broadleaves	176.7	134.3	75.3
2050	CSI	Total	75.3	57.1	35.6
		Conifers	82.9	63.3	40.8
		Broadleaves	71.3	54.1	32.6
	MSR	Total	103.2	76.4	39.2
		Conifers	133.7	100.8	58.8
		Broadleaves	87.4	64.3	28.1
	LSR	Total	83.0	48.0	17.7
		Conifers	122.5	77.0	42.0
		Broadleaves	62.5	33.6	3.9

S1 Table 5: Energy use [20] and derived material use of the harvested wood.

Wood compartments	In [%]							
	Conifers				Broadleaves			
	energy		materials		energy		materials	
	EO-	EO+	EO-	EO+	EO-	EO+	EO-	EO+
Bark and brushwood	100		0		100		0	
Forest residual wood	100	100	0	0	100	100	0	0
Branch merchantable	100	100	0	0	100	100	0	0
Round wood 1 (thin)	50	70	50	30	100	100	0	0
Round wood 2	10	25	90	75	45	85	55	15
Round wood 3	15	30	85	70	40	80	60	20
Round wood 4	20	40	80	60	40	80	60	20
Round wood 5	20	40	80	60	50	80	50	20
Round wood 6 (thick)	20	50	80	50	50	80	50	20

*EO- less energy-oriented wood market; EO+ energy-oriented wood market

S2: Wood fuel from trees outside forests (landscapes)

S2 Table 6: Theoretical and sustainable potential of wood from trees outside forests in Switzerland 2020, 2035 and 2050.

Year		Theoretical potential		Sustainable potential	
		[PJ a^{-1}][*1]	M [m^3 a^{-1}]	[PJ a^{-1}][*1]	M [m^3 a^{-1}]
2020	Minimum	7.5	0.80	3.8	0.40
	Expected	9.4	1.00	4.8	0.50
	Maximum	11.3	1.20	5.8	0.60
2035	Minimum	7.0	0.74	3.6	0.38
	Expected	11.7	1.24	6.0	0.63
	Maximum	16.4	1.74	8.4	0.88
2050	Minimum	4.6	0.49	2.4	0.25
	Expected	11.6	1.23	5.9	0.62
	Maximum	18.5	1.97	9.5	0.99

[*1]primary energy

S2 Table 7: Wood from trees outside forests. Stocked categories from the areal statistics [66] and assigned increments considering different coverage levels (optimal growth conditions: 100% and with growth according to realistic coverage levels) (for more details cf. [51]).

Stocked categories			Optimal growth; 100% coverage level [t ha^{-1} a^{-1}] dry matter	Source	Growth according to realistic coverage level [t ha^{-1} a^{-1}] dry matter	Source/ Assumption*
Group	Nr. AS	Specific information on the area				
Building areas	2	Surroundings of industrial and commercial buildings	-	-	0.6	Kaltschmitt et al. 2009
	4	Surroundings of one- and two-family houses	-	-	0.6	
	6	Surroundings of terraced houses	-	-	0.6	
	8	Surroundings of blocks of flats	-	-	0.6	
	10	Surroundings of public buildings	-	-	0.6	
	12	Surroundings of agricultural building	-	-	0.6	
	14	Surroundings of unspecified building	-	-	0.6	
	17	Roads and paths	-	-	0.6	
	31	Public parks	-	-	1.75	
	32	Sports facilities	-	-	0.6	
	33	Golf courses	-	-	0.6	
	34	Camping areas	-	-	1.75	
	35	Garden allotments	-	-	0.6	
	36	Cementeries	-	-	2.25	
Transportation areas	16	Green motorway environs	8.3	A.Müller (SBB), A. Bürgi (WSL) in FOEN 2009	4.15	FOEN 2009; coverage level 50% (FSO 2006)
	18	Green road environs	8.3	A.Müller (SBB), A. Bürgi (WSL) in FOEN 2009	4.15	
	21	Green railway environs	8.3	A.Müller (SBB), A. Bürgi (WSL) in FOEN 2009	4.15	
Agricultural areas, tree and brush vegetation	37	Intensive orchards	-	-	3.5	Kaltschmitt et al. 2009; coverage level: 100% (BFS, 2006)
	38	Field fruit trees	-	-	0.6	Based on the assumptions of Kaltschmitt et al.

Stocked categories			Optimal growth; 100% coverage level [t ha^{-1} a^{-1}] dry matter	Source	Growth according to realistic coverage level [t ha^{-1} a^{-1}] dry matter	Source/ Assumption*
Group	Nr. AS	Specific information on the area				
						2009 ochards were assumed to have coverage levels of 25% for spread-out and 100% for well-ordered orchards (FSO, 2006).
	39	Vineyards	-	-	1.5	Kaltschmitt et al., 2009
	44	Brush meadows and farm pastures	8.3	Abegg et al. 2020, conversion factor: 0.6 m^3 t^{-1} FOEN 2009	4.15	Abegg et al. 2020, conversion factor: 0.6 m^{3}t^{-1} FOEN 2009, coverage level: 50% (FSO, 2006)
Agricultural areas, tree and brush vegetation	47	Brush alpine pastures	6	FOEN 2009	3	Coverage level: 50% (FSO 2006)
	59	Clusters of trees (on agricultural areas)	8.3	Abegg et al. 2020, conversion factor: 0.6 m^3 t^{-1} FOEN 2009	0.8	Coverage level: 10% (FSO 2006).
	60	Clusters of trees (on unproductive areas)	8.3	Abegg et al. 2020, conversion factor: 0.6 m^3 t^{-1} FOEN 2009	0.8	Coverage level: 10% (FSO 2006).
	64	Scrub vegetation	5		3	Own assumption according to hedges due to lack of data.
Hedges	58	Groves, hedges	5	FOEN 2009	3	Coverage level: 60% FSO 2006
Shore zone	62	Rivers	9	FOEN 2009 for embankments	3	FOEN 2009 used 9t of dry matter for embankments. Along rivers and flood protection structures we expect rather small stockings as they are only partly vegetated.
	63	Flood protection structures	9	FOEN 2009 for embankments	3	

*for details on coverage levels see [51]

S2 Table 8: Growth per altitude and canton (upper part; based on [63]) and the corresponding net growth factors (lower part).

Canton/Altitude		>1800	1401-1800	1001-1400	601-1000	<600
AG	Growth [m3ha^{-1}a^{-1}]				10.1	10.5
AI				7.3	16.1	
AR				12.8	17.3	
BE		4.4	6.3	8.4	11.8	12.9
BLBS					7.3	8.2
FR			15.6	14.8	12	12.1
GE						7.9
GL			7	7.7	9.8	
GR		3.9	6.6	7.5	6.1	3.3
JU				10.6	8.1	11.3
LU			7.9	10.4	16.0	15.5
NE				9.8	10.0	9.2
NW			9	8.0	13.6	
OW			6.3	6.8	5.3	15.8
SG			4.3	10.7	12.6	10.2
SH					11.3	13.2
SO				7.2	7.5	10
SZ			4.9	9.8	10.2	13.6
TG					14.6	14.6
TI		3.6	5.3	5.0	4.8	5.8
UR			7.4	7.7	7.8	14.3
VD			6.7	8.5	10.2	10.8
VS		4.0	6.5	6.3	5.3	3.8
ZG			0.0	10.9	11.8	16.3
ZH				16.1	11.2	10.9
AG	Net growth factor				0.96	1.00
AI				0.45	1.00	
AR				0.74	1.00	
BE		0.34	0.49	0.65	0.91	1.00
BLBS					0.89	1.00
FR			1.00	0.95	0.77	0.78
GE						1.00
GL			0.71	0.79	1.00	
GR		0.52	0.88	1.00	0.81	0.44
JU				0.94	0.72	1.00
LU			0.49	0.65	1.00	0.97
NE				0.98	1.00	0.92
NW			0.66	0.59	1.00	
OW			0.4	0.43	0.34	1.00
SG			0.34	0.85	1.00	0.81
SH					0.86	1.00
SO				0.72	0.75	1.00
SZ			0.36	0.72	0.75	1.00
TG					1.00	1.00
TI		0.62	0.91	0.86	0.83	1.00
UR			0.52	0.54	0.55	1.00

Canton/Altitude	>1800	1401-1800	1001-1400	601-1000	<600
VD		0.62	0.79	0.94	1.00
VS	0.62	1.00	0.97	0.82	0.58
ZG		0	0.67	0.72	1.00
ZH			1	0.70	0.68

S3: Wood fuel from residues

S3 Table 9: Theoretical and sustainable potential of wood residues for energy 2020, 2035 and 2050 in Switzerland.

Year		Theoretical potential		Sustainable potential	
		[PJ a^{-1}]*1	M [m^3 a^{-1}]	[PJ a^{-1}]*1	M [m^3 a^{-1}]
2020	Minimum	60.2	8.5	5.8	0.8
	Expected	62.1	8.8	7.4	1.0
	Maximum	64.0	9.1	9.1	1.3
2035	Minimum	64.3	8.8	4.2	0.6
	Expected	66.6	9.4	6.1	0.9
	Maximum	68.8	9.7	7.7	1.1
2050	Minimum	53.9	7.6	2.4	0.3
	Expected	56.9	8.1	4.2	0.6
	Maximum	59.9	8.5	5.9	0.8

*1primary energy

S3 Table 10: Sustainable forest wood harvesting potential in Switzerland (moderate stock reduction, MSR). The reserve areas, harvest losses and costs are deducted. The wood used for materials has not yet been deducted because wood residues are produced during the processing of wood.

Year		M [m^3 a^{-1}]		
		Broadleaves	Conifers	Total
2020	Minimum	1.97	2.78	4.75
	Expected	2.47	3.42	5.89
	Maximum	2.98	4.17	7.15
2035	Minimum	1.75	2.25	4.00
	Expected	2.46	3.11	5.57
	Maximum	3.02	3.84	6.86
2050	Minimum	1.00	1.53	2.53
	Expected	1.62	2.38	3.99
	Maximum	2.18	3.19	5.38

S4: Wood fuel from waste wood

S4 Table 11: Theoretical and sustainable potential of waste wood for energy use in Switzerland in the years 2020, 2035 and 2050.

Year		Theoretical potential		Sustainable potential	
		[PJ a^{-1}]*1	M [t a^{-1}]	[PJ a^{-1}]*1	M [t a^{-1}]
2020	Minimum	12.9	0.90	10.6	0.74
	Expected	14.3	1.00	11.7	0.82
	Maximum	15.8	1.10	12.9	0.90
2035	Minimum	14.8	1.03	12.1	0.85
	Expected	16.5	1.15	13.5	0.94
	Maximum	20.3	1.41	17.0	1.18
2050	Minimum	15.3	1.07	12.6	0.88
	Expected	17.1	1.19	14.0	0.97
	Maximum	20.9	1.46	17.5	1.22

*1primary energy

S5: All woody biomass

S5 Table 12: Theoretical potential*1 of all woody biomass for energy use in Switzerland in the years, 2020, 2035 and 2050.

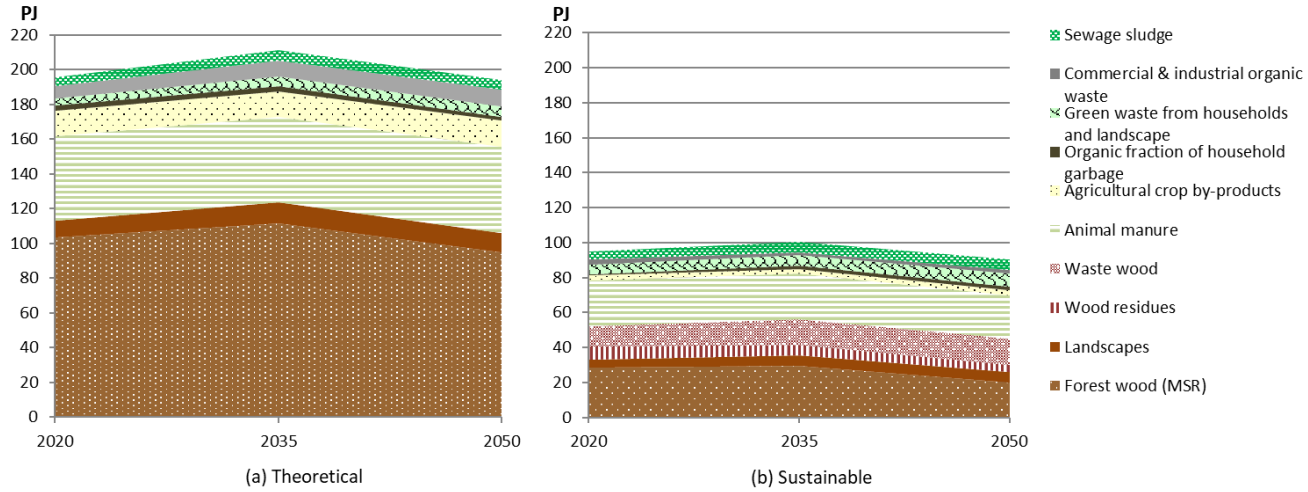
Year	Strategy	[PJ a^{-1}]*2		
		Minimum	Expected	Maximum
2020	CSI	167.2	174.7	184.6
	MSR	179.7	187.9	198.8
	LSR	194.7	203.9	216.1
2035	CSI	177.2	195.2	217.8
	MSR	192.7	205.1	222.4
	LSR	206.7	219.6	237.6
2050	CSI	164.8	188.6	217.2
	MSR	162.3	179.1	200.0
	LSR	149.1	163.2	181.0

*1 Wood residues and waste wood have their origins in forest wood and wood from landscape maintenance. In order to calculate the total theoretical potential of the woody biomass, the theoretical potential of wood residues and waste wood are therefore not added to the theoretical potential of wood fuel.
*2primary energy

S5 Table 13: Sustainable potential of all woody biomass for energy use in Switzerland, 2020, 2035 and 2050.

Year	Strategy	[PJ a^{-1}]		
		Minimum	Expected	Maximum
2020	CSI	34.1	44.7	59.5
	MSR	40.1	54.2	64.5
	LSR	45.9	63.4	75.1
2035	CSI	33.6	46.7	64.8
	MSR	42.7	57.3	71.8
	LSR	43.5	61.8	77.8
2050	CSI	29.8	42.6	60.3
	MSR	30.4	44.2	59.4
	LSR	26.5	38.6	52.9

S6: All biomass types



S6 Figure1: Theoretical and sustainable potential fuel potentials of all biomass types for 2020, 2035 and 2050. For woody biomass the scenario "expected" was applied and for wood fuel from forests the management strategy moderate stock reduction (MSR) with a less energy oriented wood market (EO-) was applied. The values for the non-woody biomass types were estimated [30] for the first time-step (values for 2014 were used for 2020) and for [39] for the future (2035, 2050).

*Wood residues and waste wood have their origins in the forest wood and wood from landscape maintenance. In order to calculate the total theoretical potential of the woody biomass, the theoretical potential of wood residues and waste wood are therefore not added to the theoretical potential of wood fuel.

S6 Table 14: Comparison of wood that has already been used and the woody and non-woody (wet-biomass) energy potentials in Switzerland [PJ; primary energy] today (2020) and in the future (2035, 2050) [PJ; primary energy].

Category		Already used		Theoretical (2020)		Sustainable (2020)		Theoretical (2035)		Sustainable (2035)		Theoretical (2050)		Sustainable (2050)	
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Woody	Forests	16.7 [*3]	CSI[*6]	86.6	99.5	13.9	24.9	91.1	112.3	13.7	31.7	91.0	117.9	12.4	27.4
			MSR[*6]	99.1	107.7	19.9	36.7	106.6	116.9	20.4	38.7	88.5	100.7	13.0	26.5
			LSR[*6]	114.1	125.0	25.7	47.3	120.6	132.1	23.6	44.7	75.5	81.7	9.1	20.0
	Landscapes	2.3 [*2]		7.5	11.3	3.8	5.8	7.0	16.4	3.6	8.4	4.6	18.5	2.4	9.5
	Wood residues[*4]	7.8 [*2]		[60.2]	[64.0]	5.8	9.1	[64.3]	[68.8]	4.2	7.7	[53.9]	[59.9]	2.4	5.9
	Waste wood[*4]	9.2 [*2]		[12.9]	[15.8]	10.6	12.9	[14.8]	[20.3]	12.1	17	[15.3]	[20.9]	12.6	17.5
All woody biomass		36.0	CSI[*6]	94.1	110.8	34.1	52.7	98.1	128.7	33.6	64.8	95.6	136.4	29.8	60.3
			MSR[*6]	106.6	119.0	40.1	64.5	113.6	133.3	40.3	71.8	93.1	119.2	30.4	59.4
			LSR[*6]	121.6	136.3	45.9	75.1	127.6	148.5	43.5	77.8	80.1	100.2	26.5	52.9
Non-woody	Animal manure	2.6 [*2]		48.8 [*2]		26.9 [*2]		49.2 [*1]		26.2 [*1]		49.4 [*1]		25.0 [*1]	
	Agricultural crop by products	0.0 [*2]		14.9 [*2]		2.6 [*2]		15.0 [*1]		2.7 [*1]		15.0 [*1]		2.7 [*1]	
	Organic fraction of household garbage	6.0 [*2]		6.0 [*2]		3.9 [*2]		2.7 [*1]		1.6 [*1]		2.1 [*1]		2.1 [*1]	
	Green waste from households and landscape	2.2 [*2]		4.3 [*2]		5.8 [*2]		5.6 [*1]		6.1 [*1]		6.3 [*1]		7.8 [*1]	
	Commercial and industrial organic waste	2.0 [*2]		13.6 [*2]		2.7 *[2]		9.3 [*1]		1.8 [*1]		9.3 [*1]		1.8 [*1]	
	Sewage sludge	3.4 [*2]		4.9 [*2]		4.9 [*2]		5.8 [*1]		5.8 [*1]		6.0 [*1]		6.0 [*1]	
All non-woody biomass		16.2		92.5		46.8		87.6		44.2		88.1		45.4	
All biomass		52.2	CSI[*6]	186.6	203.3	80.9	99.5	185.7	216.3	77.8	109.0	183.7	224.5	75.2	105.7
			MSR[*6]	199.1	211.5	86.9	111.3	201.2	220.9	84.5	116.0	181.2	207.3	75.8	104.8
			LSR[*6]	214.1	228.8	92.7	121.9	215.2	236.1	87.7	122.0	168.2	188.3	71.9	98.3

[*1] Non-woody biomass from [39]

[*2] [30]

[*3] [20]

[*4] Wood residues and waste wood have their origins in the forest wood and wood from landscape maintenance. In order to calculate the total theoretical potential of the woody biomass, the theoretical potential of wood residues and waste wood are therefore not added to the theoretical potential of wood fuel.

[*5] Using the already used amount a starting point and the SPs as the upper limit.

[*6] Applied management scenario in forests (CSI: Continuous stock increase; MSR: moderate stock reduction; LSR: Large stock reduction).