		H	C	N	SOM	O
"H"	Pearson Corr.	1	0,99543	0,98074	0,99379	0,97233
	p-value	--	4,13668E-30	2,09877E-21	3,0161E-28	3,18251E-19
"C"	Pearson Corr.	0,99543	1	0,98038	0,99584	0,97193
	p-value	4,13668E-30	--	2,71309E-21	1,10894E-30	3,88394E-19
"N"	Pearson Corr.	0,98074	0,98038	1	0,97355	0,94261
	p-value	2,09877E-21	2,71309E-21	--	1,71198E-19	7,24159E-15
"SOM"	Pearson Corr.	0,99379	0,99584	0,97355	1	0,98924
	p-value	3,0161E-28	1,10894E-30	1,71198E-19	--	6,36384E-25
"O"	Pearson Corr.	0,97233	0,97193	0,94261	0,98924	1
	p-value	3,18251E-19	3,88394E-19	7,24159E-15	6,36384E-25	--

2-tailed test of significance is used

Table S1 : Pearson´s correlation results with the elemental composition of the samples and the soil organic matter content (SOM).

		$\Delta_c G(SOM)_{P\&E}$	$\Delta_c G(SOM)_{S\&O}$	$\Delta_c G(SOM)_{DSC}$
$\Delta_c G(SOM)_{P\&E}$	Pearson Corr.	1	0,99343*	0,79001*
	p-value	--	6,5234E-28	2,08558E-7
$\Delta_c G(SOM)_{S\&O}$	Pearson Corr.	0,99343*	1	0,83811*
	p-value	6,5234E-28	--	7,50898E-9
$\Delta_c G(SOM)_{DSC}$	Pearson Corr.	0,79001*	0,83811*	1
	p-value	2,08558E-7	7,50898E-9	--

2-tailed test of significance is used

***: Correlation is significant at the 0.05 level**

Table S2: Correlation obtained among the three rows for the Gibbs energy values obtained by equation 9 with each of the enthalpies of combustion obtained by Pattel and Ericksson model and Sandler and Orbey model applied to $E_{formula}$ and by the experimental value for the enthalpy of combustion given by TG-DSC with Sandler and Orbey correlation for the Gibbs energy.

Samples	$\Delta_c S^0_{SOM}$ (Battley´s model) Path 1	$\Delta_c S^0_{SOM}$ S&O model Path 2
AZT14LF	127,02	19,35
AZT 14 M0/5	166,79	22,05
AZT14M5/10	181,21	19,86
AZT15LF	97,02	14,36
AZT15M0/5	149,12	19,39
AZT15M5/10	178,41	20,76
AZT16LF	105,60	15,56
AZT16M0/5	130,77	18,13
AZT16M5/10	185,78	22,19
AZT22LF	104,86	16,38
AZT22M0/5	143,85	21,49
AZT22M5/10	211,86	28,09
ARAFACLF	102,93	15,88
ARAFACM0/5	109,51	18,62
ARAFACM5/10	142,09	22,06
ARALACLF	107,62	17,51
ARALACM0/5	140,96	18,88
ARALACM5/10	148,32	18,09
ARAFBCLF	90,97	16,35
ARAFBCM0/5	104,28	19,42
ARAFBCM5/10	102,15	19,04
LIZ19LF	103,44	15,86
LIZ19M0/5	163,40	25,97
LIZ19M5/10	195,42	30,08
LIZ17LF	102,50	15,96
LIZ17M0/5	199,50	29,95
LIZ17M05/10	223,99	33,03
LIZ18LF	102,18	16,38
LIZ18M0/5	152,62	22,56
LIZ18M5/10	179,45	25,75

Table S3: Data for the entropy change of the combustion reaction of SOM obtained by path 1 and path 2. Values are significantly different but significantly correlated (Pearson´s correlation = 0.885 , $p < 0.0001$). The units are J/C-mol K.