Attachment 6 – Excel

(Including IDA ICE inputs, LCA calculations, tables, and figures)

Production of Silica Aerogel (TEOS, Base-Catalyzed)

HTSCD

Process 1 - Gel preparation [40 ml aerogel]

Raw materials used in gel preparation (HTSCD)	Volume (ml)	Mass (g)
Methanol	16	12.52
Analytical reagent grade water	8	8
Ammonia 2 M	0.016	0.014
Tetramethoxysilane	14.4	14.64
Methyltrimethoxysilane	1.6	1.36
Electrical equipment:	Running time (h)	Total (kWh)
Fan cupboard	00:43:00	0.063

Process 2 - Ageing

Raw materials used in ageing (HTSCD)	Volume (ml)	Mass (g)
Methanol - covering samples	8	6.33
Methanol - 1st exchange	125	98.88
Methanol - 2nd exchange	125	98.88
Electrical equipment:	Running time (h)	Total (kWh)
Fan cupboard	00:10:00	0.014

Process 3 - Drying

Raw materials used in drying (HTSCD)	Volume (ml)	Mass (g)
Methanol	400	316.4
Nitrogen (N_2 at 100 bar, 296 K)	500	0.057
Electrical equipment	Running time (h)	Total (kWh)
Heater	02:15:00	0.882
Temperature sensor	04:00:00	0.013

Factors not included:

Emissions to air, water and ground
Waste treatment
Transport
Overhead electricity and gas usage

Required lighting in Mosseveien 104

Lux minimum requirement	
Offices [mid]	500 lux

Lighting armature 2x54W [lm]	Ref_roof	Ref_Wall	Ref_Plan	v	η	h_a [m]	h_1floor [m]	h_2floor [m]
Φ = 8900	0.7	0.5	0.2	0.75	0.61	1	4.3	2.7

	Zone	Squaremeters [m²]	Length/Width [m]	h_m [m]	Room index	Min. required armatures
First floor	Garage/workshop 1	87.16	9.336	3.3	1.414538	10.7030
	Garage/workshop 2	89.20	9.445	3.3	1.430996	10.9535
	Technical room	18.12	4.257	3.3	0.644964	2.22509
	Washroom	36.00	6.000	3.3	0.909091	4.42070
	Stairs	29.10	5.394	3.3	0.817340	3.57340
	Display	535.0	23.13	3.3	3.504556	65.6966
	Toilet/wardrobe	23.12	4.808	3.3	0.728534	2.83907
	Office 1.1	13.59	3.686	3.3	0.558555	1.66882
	Office 1.2	12.14	3.484	3.3	0.527917	1.49076
Second floor	Office 2.1	80.76	8.987	1.7	2.643134	9.91711
	Office 2.2	111.8	10.57	1.7	3.109868	13.7287
	Office 2.3	79.67	8.926	1.7	2.625237	9.78326
	Office 2.4	70.48	8.395	1.7	2.469187	8.65476
	Office 2.5	112.9	10.63	1.7	3.125130	13.8638
	Office 2.6	108.2	10.40	1.7	3.059389	13.2867
	Office 2.7	43.36	6.585	1.7	1.936715	5.32449
	Office 2.8	16.33	4.041	1.7	1.188541	2.00528
	Meeting room	16.27	4.034	1.7	1.186356	1.99791
	Stairs, kitchen, corridor	146.5	12.10	1.7	3.559917	17.9898
	Women toilet	11.83	3.439	1.7	1.011611	1.45269
	Men toilet	10.72	3.274	1.7	0.962983	1.31639
	HCWC	5.522	2.350	1.7	0.691145	0.67809
	Broom cupboard	3.740	1.934	1.7	0.568796	0.45926
	Silent room	10.71	3.273	1.7	0.962533	1.31516

IDA ICE DATA

Table X

Building component	Area [m²]	U-value [W/(m²·K)]	U*A [W/K]
Walls	782.32	0.1856	145.20
Floor	861.51	0.0982	84.57
Roof	828.66	0.1388	115.02
Windows	296.12	N/A	N/A
Total	2768.61	N/A	N/A
Model volume	**Window-to-wall**	**Window-to-envelope**	**Envelope area per volume**
6858.6 m³	…%	…%	0.4081 m²/m³

N/A - Non-applicable. Window properties will vary from each case, hence will also the heat transfer coefficient and total value vary from each case.

Table X

Geographical information of the location. Table shows latitude, longitude, elevation and time-zone.

City and country	Latitude [°]	Longitude [°]	Elevation [m]	Time zone [h]
Fredrikstad, Norway	59.23 N	10.91 E	6	1.0 E

Building component	U-value [W/(m²·K)]	Comments
Walls		
Internal walls	0.285	Interior wall with insulation.
External walls	0.186	PIR wall sandwich panels EMW-PIR1000.
Floor	0.098	Internal floor with concrete and XPS
Roof	0.116	Concrete joist roof.
Windows		
Normal windows	1.000	© Saint-Gobain T4-12 m. PLANITHERM ULTRA+ar.
Aerogel glazings	0.282	Kalwall glazing system with aerogel, 70 mm.
Doors	1.085	Entrance door.

Building case	Description of the building case
Window base case	Base case scenario with no aerogel solar walls, only regular windows.
Aerogel and window combination	Windows are partially replaced with the aerogel solar walls, and the residents still have a view of the outdoor surroundings.
Aerogel maximum exploitation	All windows are replaced with aerogel solar walls. This simulates the highest amount of reduction on the energy consumption of the reference building by just changing the window type.

Table X

Climate data for Fredrikstad*. Table shows monthly values for dry-bulb temperature, direct normal radiation, diffuse radiation on horizontal surface and cloudness.

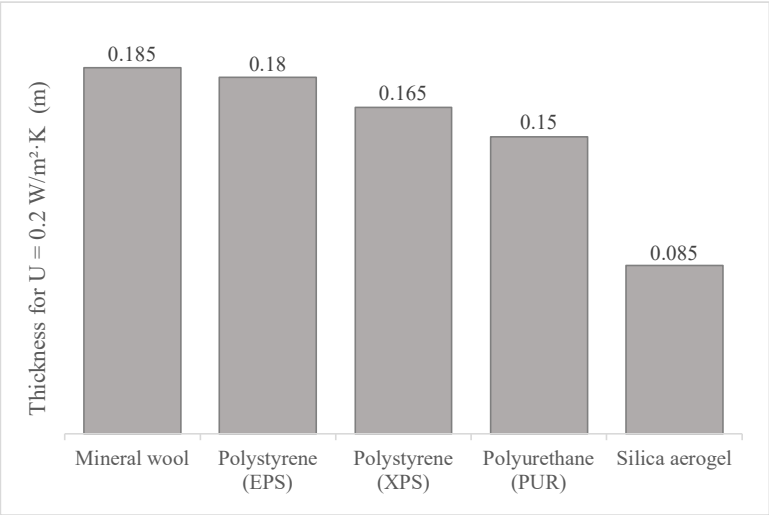
	Dry-bulb temperature [°C]	Direct normal radiation [W/m²]	Diffuse radiation on horizontal surface [W/m²]	Cloudiness [%]
Month				
January	-3.8	23.2	8.8	72.5
February	-0.9	35.4	22.2	64.1
March	0.9	79.1	47.4	65.4
April	4.6	100.1	78.1	63.4
May	11.9	163.3	102.2	56
June	14.7	150.2	126.1	57.8
July	17.5	156.8	110.1	59.6
August	16.6	107.5	94	63.9
September	11.1	60	65.8	68.7
October	6.7	44.2	31.9	70.5
November	1.8	21.5	11.5	70.9
December	-1.6	11.2	5.2	74.4
Mean	6.7	79.7	58.8	65.6
Min	-3.8	11.2	5.2	56
Max	17.5	163.3	126.1	74.4

* Weather data downloaded for Oslo Fornebu

Comparison of thermal properties (U-values) of some common thermal insulation materials

Insulation type	k-values		Mid.	
Mineral wool	0,032 - 0,042	W/m·K	0.037	W/m·K
Polystyrene (EPS)	0,031 - 0,041	W/m·K	0.036	W/m·K
Polystyrene (XPS)	0,027 - 0,039	W/m·K	0.033	W/m·K
Polyurethane	0,023 - 0,038	W/m·K	0.030	W/m·K
Silica aerogel	0,012 - 0,022	W/m·K	0.017	W/m·K

Thickness for U =	0.2 $W/m^2 \cdot K$	
Mineral wool	0.185	m
Polystyrene (EPS)	0.18	m
Polystyrene (XPS)	0.165	m
Polyurethane (PUR)	0.15	m
Silica aerogel	0.085	m



k-values taken from Byggforsk [471.010] - Varmekonduktivitet og varmemotstand for bygningsmaterialer
https://www.byggforsk.no/dokument/209/varmekonduktivitet_og_varmemotstand_for_bygningsmaterialer?gclid=Cj0KCQiA09eQBhCxARIsAAYRiynt_7mj-yYTNuMm5CH9yx2ZI_YS-22ooRmcq5B59H-TiCM1qe4man4aAs8LEALw_wcB

Table X. Glass pane properties of the aerogel solar wall.

	Transmittar	Reflectance outside	Reflectance inside
Total shortwave	0.10	0.55	0.55
Visible	0.20	0.55	0.55
Diffusion (solar radiation)	1.00	0.40	0.40

DATA - LCA

Table X: Overview of classification and characterization factors in the life cycle impact assessment.

Impact indicators	Unit
Global warming potential (GWP)	kg CO_2-eq
Freshwater Eutrophication Potential (FEP)	kg SO_2-eq
Particulate Matter Formation Potential (PMFP)	kg 1,4-DC
Photochemical Oxidant Formation Potential (POFP)	kg CFC-11
Human Toxicity Potential (HTP)	kg 1,4-DC
Ozone Depletion Potential (ODP)	kg CFC-11

Functional unit	Unit
Silica aerogel	1 kg
Aerogel solar wall	1 aerogel solar wall measuring 1.20 m x 2.40 m with an expected service life of 30 years and U-value = 0.28 W/m2·K.

Table X: Overview of …(source) for the emissions, found in Eibrowser.

Names: Product process	**Applied to**
Materials	
Market for methanol - methanol/market for methanol/GLO/kg	Methanol
Market for ammonia, liquid/RoW/kg	Ammonia 2 M
Market for tetraethyl orthosilicate/GLO/kg	Tetramethoxysilane, methyltrimethoxysilane
Market for nitrogen, liquid/RER/kg	Nitrogen
Market group for tap water/GLO/kg	Reagent grade water
Market for glass fibre reinforced plastic, polyamide, injection moulded/GLO/kg	Translucent FRP Faces, polyamide thermal break
Market for aluminium, cast alloy/GLO/kg	Aluminium
Market for steel, low-alloyed/GLO/kg	Steel screws
Transport	
Market group for transport, freight train/GLO/metric ton*km	Transportation by train
Market for transport, freight, sea, transoceanic ship/GLO/metric ton*km	Transportation by ship
Market for transport, freight, lorry 16-32 metric ton, EURO6/RER/metric ton*km	Transportation by truck
Electricity	
Electricity, low voltage/market for electricity, low voltage/NPCC, US only/kWh	Electricity in US
Electricity, low voltage/market for electricity, low voltage/DE/kWh	Electricity in Germany
Electricity, low voltage/market for electricity, low voltage/NO/kWh	Electricity in Norway

SENSITIVITY ANALYSIS

Table X: Emissions from the methanol based on the degree of recycling.

Production scale	GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	1.3906E+03	2.6671E-01	1.6296E+00	4.5359E+00	4.1751E+02	4.1535E-04
Industrial 1	3.0425E+02	5.8354E-02	3.5655E-01	9.9243E-01	9.1348E+01	9.0874E-05
Industrial 2	1.6846E+02	3.2309E-02	1.9741E-01	5.4949E-01	5.0577E+01	5.0315E-05

Table X: Total emissions from the production of silica aerogel.

Production scale		GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	USA	1.8194E+03	4.7350E-01	2.4349E+00	5.7987E+00	6.0943E+02	4.8904E-04
	Germany	1.9241E+03	7.5701E-01	2.5055E+00	5.9156E+00	7.7720E+02	4.7663E-04
	Norway	1.7190E+03	4.4918E-01	2.2753E+00	5.6488E+00	5.8921E+02	4.6716E-04
Industrial 1	USA	7.3308E+02	2.6514E-01	1.1618E+00	2.2552E+00	2.8327E+02	1.6457E-04
	Germany	8.3770E+02	5.4866E-01	1.2324E+00	2.3721E+00	4.5104E+02	1.5216E-04
	Norway	6.3261E+02	2.4082E-01	1.0022E+00	2.1053E+00	2.6305E+02	1.4269E-04
Industrial 2	USA	5.9729E+02	2.3910E-01	1.0027E+00	1.8122E+00	2.4250E+02	1.2401E-04
	Germany	7.0191E+02	5.2261E-01	1.0733E+00	1.9291E+00	4.1027E+02	1.1160E-04
	Norway	4.9682E+02	2.1478E-01	8.4308E-01	1.6624E+00	2.2228E+02	1.0213E-04

Table X: Total emissions from the production of one aerogel solar wall.

Production scale		GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	USA	2.4995E+03	6.8595E-01	3.8099E+00	7.6118E+00	8.5128E+02	5.7264E-04
	Germany	2.8449E+03	1.6308E+00	4.0202E+00	7.9492E+00	1.4104E+03	5.3060E-04
	Norway	2.1557E+03	6.0386E-01	3.2371E+00	7.0186E+00	7.8228E+02	4.9819E-04
Industrial 1	USA	1.4131E+03	4.7760E-01	2.5368E+00	4.0682E+00	5.2512E+02	2.4816E-04
	Germany	1.7586E+03	1.4224E+00	2.7471E+00	4.4057E+00	1.0843E+03	2.0613E-04
	Norway	1.0693E+03	3.9551E-01	1.9641E+00	3.4751E+00	4.5612E+02	1.7372E-04
Industrial 2	USA	1.2773E+03	4.5155E-01	2.3777E+00	3.6253E+00	4.8435E+02	2.0761E-04
	Germany	1.6228E+03	1.3964E+00	2.5879E+00	3.9628E+00	1.0435E+03	1.6557E-04
	Norway	9.3351E+02	3.6946E-01	1.8049E+00	3.0321E+00	4.1535E+02	1.3316E-04

Degree of recycled methanol	**Global warming potential [kg CO2-eq]**		
	Location of production *		
	USA	Germany	Norway
Bench (0%)	2499.46	2844.94	2155.65
Industry 1 (80%)	1413.11	1758.59	1069.30
Industry 2 (90%)	1277.32	1622.80	933.51

Green: 0 - 1200
Orange: 1200-2400
Red: 2400 and over

* Includes both transport and energy intensities for each country.
(Standard panel size: Medium)

Material composition	**Global warming potential [kg CO2-eq]**		
	Location of production *		
	USA	Germany	Norway
Big (1.5x6.0 m)	1527.58	1869.48	1194.73
Medium (1.2x2.4 m)	1413.11	1758.59	1069.30
Small (0.9x1.2 m)	1356.51	1706.71	1010.32

* Includes both transport and energy intensities for each country.

Green: 0 - 1100
Orange: 1100-1500
Red: 1500 and over

Life cycle inventory

Table X: Life cycle inventory for 1 kg silica aerogel HTSCD (Phase A1-A3)*

Stage	Item	Unit	Value
Gel preperation	Methanol	kg	4.603
	Reagent grade water	kg	2.941
	Ammonia 2.0 M	kg	0.005
	Tetramethoxysilane (TEOS)	kg	5.382
	Methyltrimethoxysilane	kg	0.500
	Electricity (fan cupboard)	kWh	23.162
	Running time (h): 00:43:00		
Ageing	Methanol - covering samples	kg	2.327
	Methanol - 1st exchange	kg	36.353
	Methanol - 2nd exchange	kg	36.353
	Electricity (fan cupboard)	kWh	5.147
	Running time (h): 00:10:00		
Drying	Methanol	kg	116.324
	Nitrogen (N_2 at 100 bar, 296 K)	kg	0.021
	Electricity (Heater)	kWh	324.265
	Running time (h): 02:15:00		
	Electricity (Temperature sensor)	kWh	4.779
	Running time (h): 04:00:00		

* Ganget opp fra oppskriften til å passe min funksjonelle enhet.

Table X: Life cycle inventory for one aerogel glazing measuring 1.20 m x 2.40 m (Phase A1-A4)*

Stage	Item	Unit	Value
Product	Lumira® Aerogel LA1000	kg	11.151
	Fiberglass reinforced polymer (FRP) faces	kg	1.558
	Aluminum frame, grid core and spacer	kg	67.395
	Polyamide thermal break	kg	5.999
	Steel screws	kg	0.114
	Electricity	kWh	833.333
Construction Process	Transport		
	USA	tkm	546.793
	Germany	tkm	100.530
	Norway	tkm	12.933

* Estimert mengde etter arbeidstegninger, kalkulert selv.

Reversed engineering - Når jeg gjenskaper noe gjennom å se på det / tegninger. "Lager" produktet på nytt basert på det. Søk på Google for definisjon.

Table X: Distance for … (USA)

Material	Origin	Destination	Truck [km]	Train [km]	Ship [km]	Total [km]
Lumira Aerogel	Boston, Massachusetts,	Manchester, New Hampshire, USA	86	0	0	86
Aerogel solar walls	Manchester, New Hampshire,	Fredrikstad, Norway	301	0	5955	6256

Table X: Distance for … (Germany, Essen)

Material	Origin	Destination	Truck [km]	Train [km]	Ship [km]	Total [km]
Lumira Aerogel	Frankfurth,	Essen, Germany	235	0	0	235
Aerogel solar walls	Essen, Germany	Fredrikstad, Norway	571	360	0	931

Table X: Distance for … (Kongsberg, Norway)

Material	Origin	Destination	Truck [km]	Train [km]	Ship [km]	Total [km]
Lumira Aerogel	Kongsberg,	Kongsberg, Norway	2	0	0	2
Aerogel solar walls	Kongsberg,	Fredrikstad, Norway	148	0	0	148

Table X: Bench plant specifications; assumptions made on an industrial scale.

Scale	**Bench**	**Industrial 1**	**Industrial 2**
Batch volume [L]	0.04	1	20
Methanol recycled [%]	0	0.8	0.9

Table X: Emission intensities for some energy mixes

Energy mix	Carbon intensity (gCO_2eq/kWh)
USA	312.86
Germany	605.63
Norway	31.723

	Material	**Origin**	**Destination**	**Truck [km]**	**Train [km]**	**Ship [km]**	**Total [km]**
US	Lumira Aerogel	Boston, Massachusetts, USA	Manchester, New Hampshire, USA	86	0	0	86
	Aerogel solar walls	Manchester, New Hampshire, USA	Fredrikstad, Norway	301	0	5955	6256
DE	Lumira Aerogel	Frankfurth, Germany	Essen, Germany	235	0	0	235
	Aerogel solar walls	Essen, Germany	Fredrikstad, Norway	571	360	0	931
NO	Lumira Aerogel	Kongsberg, Norway	Kongsberg, Norway	2	0	0	2
	Aerogel solar walls	Kongsberg, Norway	Fredrikstad, Norway	148	0	0	148

LCIA

Table X: Emissions from the production and transportation of silica aerogel and solar walls from USA to Mosseveien 104.

	Material	GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Silica aerogel	Methanol	3.0425E+02	5.8354E-02	3.5655E-01	9.9243E-01	9.1348E+01	9.0874E-05
	Ammonia 2 M	1.1998E-01	1.0875E-05	1.4473E-04	2.2855E-04	2.7036E-02	1.8480E-08
	Tetramethoxysilane	2.8990E+02	1.5894E-01	5.7076E-01	9.9457E-01	1.4194E+02	4.6430E-05
	Methyltrimethoxysilane	2.6931E+01	1.4765E-02	5.3021E-02	9.2392E-02	1.3186E+01	4.3131E-06
	Nitrogen	5.7290E-02	5.9393E-05	1.0492E-04	1.4014E-04	3.9891E-02	6.1968E-09
	Reagent grade water	1.7885E-02	1.0021E-05	5.1082E-05	5.9455E-05	1.0075E-02	3.3843E-09
	Electricity	1.1180E+02	3.2997E-02	1.8117E-01	1.7535E-01	3.6718E+01	2.2925E-05
Translucent aerogel solar walls	Translucent FRP Faces	1.3745E+01	1.3710E-03	1.7939E-02	3.5015E-02	1.0226E+00	2.6096E-07
	Polyamide, Thermal Break	5.2936E+01	5.2802E-03	6.9087E-02	1.3485E-01	3.9382E+00	1.0050E-06
	Aluminum (6063-T6 or 600-T5 alloy)	3.4130E+02	1.2743E-01	8.2084E-01	1.1347E+00	1.4875E+02	2.6948E-05
	Steel, Screws	1.8508E-01	1.9068E-04	8.3519E-04	9.2567E-04	3.1004E-01	8.0046E-09
	Electricity	2.6072E+02	7.6947E-02	4.2248E-01	4.0892E-01	8.5626E+01	5.3461E-05
			680.0323986				
Transport	Ship	5.7702E+00	7.8934E-04	3.6600E-02	8.6068E-02	7.0142E-01	9.2015E-07
	Truck (EURO6)	5.3746E+00	4.4517E-04	7.2335E-03	1.2647E-02	1.5060E+00	9.9038E-07
	Lorry 16-32 metric ton						

Table X: Emissions from the production and transportation of silica aerogel and solar walls from Germany to Mosseveien 104.

	Material	GWP [kg CO_2-eq]	FEP [kg SO2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Silica aerogel	Methanol	3.0425E+02	5.8354E-02	3.5655E-01	9.9243E-01	9.1348E+01	9.0874E-05
	Ammonia 2 M	1.1998E-01	1.0875E-05	1.4473E-04	2.2855E-04	2.7036E-02	1.8480E-08
	Tetramethoxysilane	2.8990E+02	1.5894E-01	5.7076E-01	9.9457E-01	1.4194E+02	4.6430E-05
	Methyltrimethoxysilane	2.6931E+01	1.4765E-02	5.3021E-02	9.2392E-02	1.3186E+01	4.3131E-06
	Nitrogen	5.7290E-02	5.9393E-05	1.0492E-04	1.4014E-04	3.9891E-02	6.1968E-09
	Reagent grade water	1.7885E-02	1.0021E-05	5.1082E-05	5.9455E-05	1.0075E-02	3.3843E-09
	Electricity	2.1642E+02	3.1651E-01	2.5178E-01	2.9224E-01	2.0449E+02	1.0517E-05
Translucent aerogel solar walls	Translucent FRP Faces	1.3745E+01	1.3710E-03	1.7939E-02	3.5015E-02	1.0226E+00	2.6096E-07
	Polyamide, Thermal Break	5.2936E+01	5.2802E-03	6.9087E-02	1.3485E-01	3.9382E+00	1.0050E-06
	Aluminum (6063-T6 or 600-T5 alloy)	3.4130E+02	1.2743E-01	8.2084E-01	1.1347E+00	1.4875E+02	2.6948E-05
	Steel, Screws	1.8508E-01	1.9068E-04	8.3519E-04	9.2567E-04	3.1004E-01	8.0046E-09
	Electricity	5.0469E+02	7.3810E-01	5.8713E-01	6.8149E-01	4.7686E+02	2.4525E-05
Transport	Train	3.5023E+00	1.0173E-03	1.2747E-02	3.6080E-02	1.0848E+00	3.8783E-07
	Truck (EURO6)	4.5275E+00	3.7500E-04	6.0933E-03	1.0653E-02	1.2686E+00	8.3427E-07
	Lorry 16-32 metric ton						

Table X: Emissions from the production and transportation of silica aerogel and solar walls from Kongsberg to Mosseveien 104.

	Material	GWP [kg CO_2-eq]	FEP [kg SO2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Silica aerogel	Methanol	3.0425E+02	5.8354E-02	3.5655E-01	9.9243E-01	9.1348E+01	9.0874E-05
	Ammonia 2 M	1.1998E-01	1.0875E-05	1.4473E-04	2.2855E-04	2.7036E-02	1.8480E-08
	Tetramethoxysilane	2.8990E+02	1.5894E-01	5.7076E-01	9.9457E-01	1.4194E+02	4.6430E-05
	Methyltrimethoxysilane	2.6931E+01	1.4765E-02	5.3021E-02	9.2392E-02	1.3186E+01	4.3131E-06
	Nitrogen	5.7290E-02	5.9393E-05	1.0492E-04	1.4014E-04	3.9891E-02	6.1968E-09
	Reagent grade water	1.7885E-02	1.0021E-05	5.1082E-05	5.9455E-05	1.0075E-02	3.3843E-09
	Electricity	1.1336E+01	8.6785E-03	2.1586E-02	2.5489E-02	1.6497E+01	1.0417E-06
Translucent aerogel solar walls	Translucent FRP Faces	1.3745E+01	1.3710E-03	1.7939E-02	3.5015E-02	1.0226E+00	2.6096E-07
	Polyamide, Thermal Break	5.2936E+01	5.2802E-03	6.9087E-02	1.3485E-01	3.9382E+00	1.0050E-06
	Aluminum (6063-T6 or 600-T5 alloy)	3.4130E+02	1.2743E-01	8.2084E-01	1.1347E+00	1.4875E+02	2.6948E-05
	Steel, Screws	1.8508E-01	1.9068E-04	8.3519E-04	9.2567E-04	3.1004E-01	8.0046E-09
	Electricity	2.6436E+01	2.0238E-02	5.0337E-02	5.9438E-02	3.8471E+01	2.4293E-06
Transport	Truck (EURO6)	2.0832E+00	1.7255E-04	2.8037E-03	4.9019E-03	5.8372E-01	3.8387E-07
	Lorry 16-32 metric ton						

Table X: Emissions from the methanol based on the degree of recycling (for 12.321464 kg aerogel).

Production scale	GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	1.3906E+03	2.6671E-01	1.6296E+00	4.5359E+00	4.1751E+02	4.1535E-04
Industrial 1	3.0425E+02	5.8354E-02	3.5655E-01	9.9243E-01	9.1348E+01	9.0874E-05
Industrial 2	1.6846E+02	3.2309E-02	1.9741E-01	5.4949E-01	5.0577E+01	5.0315E-05

Table 3. Overview of classification and characterization factors in the life cycle impact assessment.

Impact indicators	Unit
Global warming potential (GWP)	kg CO_2 eq.
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg ethene eq.
Acidification potential of land and water (AP)	kg SO2- eq.
Eutrophication potential (EP)	kg (PO4)3- eq.
Abiotic resource depletion potential for elements (ADPM)	kg Sb eq.
Abiotic resource depletion potential for fossil fuels (ADPE)	MJ, net calorific value
Human toxicity potential (HTP)	kg DCB eq.
Eco–toxicity potential (ETP)	kg DCB eq.

Table X: Total emissions from the production of needed silica aerogel for one aerogel solar wall.

Production scale		GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	USA	1.8194E+03	4.7350E-01	2.4349E+00	5.7987E+00	6.0943E+02	4.8904E-04
	Germany	1.9241E+03	7.5701E-01	2.5055E+00	5.9156E+00	7.7720E+02	4.7663E-04
	Norway	1.7190E+03	4.4918E-01	2.2753E+00	5.6488E+00	5.8921E+02	4.6716E-04
Industrial 1	USA	7.3308E+02	2.6514E-01	1.1618E+00	2.2552E+00	2.8327E+02	1.6457E-04
	Germany	8.3770E+02	5.4866E-01	1.2324E+00	2.3721E+00	4.5104E+02	1.5216E-04
	Norway	6.3261E+02	2.4082E-01	1.0022E+00	2.1053E+00	2.6305E+02	1.4269E-04
Industrial 2	USA	5.9729E+02	2.3910E-01	1.0027E+00	1.8122E+00	2.4250E+02	1.2401E-04
	Germany	7.0191E+02	5.2261E-01	1.0733E+00	1.9291E+00	4.1027E+02	1.1160E-04
	Norway	4.9682E+02	2.1478E-01	8.4308E-01	1.6624E+00	2.2228E+02	1.0213E-04

733.0799076 0.51876974

1413.112306

Table X: Total emissions from the production and transportation of one aerogel solar wall.

Production scale		GWP [kg CO_2-eq]	FEP [kg SO_2-eq]	PMFP [kg 1,4-DC]	POFP [kg CFC-11]	HTP [kg 1,4-DC]	ODP [kg CFC-11]
Bench	USA	2.4995E+03	6.8595E-01	3.8099E+00	7.6118E+00	8.5128E+02	5.7264E-04
	Germany	2.8449E+03	1.6308E+00	4.0202E+00	7.9492E+00	1.4104E+03	5.3060E-04
	Norway	2.1557E+03	6.0386E-01	3.2371E+00	7.0186E+00	7.8228E+02	4.9819E-04
Industrial 1	USA	1.4131E+03	4.7760E-01	2.5368E+00	4.0682E+00	5.2512E+02	2.4816E-04
	Germany	1.7586E+03	1.4224E+00	2.7471E+00	4.4057E+00	1.0843E+03	2.0613E-04
	Norway	1.0693E+03	3.9551E-01	1.9641E+00	3.4751E+00	4.5612E+02	1.7372E-04
Industrial 2	USA	1.2773E+03	4.5155E-01	2.3777E+00	3.6253E+00	4.8435E+02	2.0761E-04
	Germany	1.6228E+03	1.3964E+00	2.5879E+00	3.9628E+00	1.0435E+03	1.6557E-04
	Norway	9.3351E+02	3.6946E-01	1.8049E+00	3.0321E+00	4.1535E+02	1.3316E-04

kg CO2 for:

51.3274781 **32.66** Methanol brukt uansett 0.97651076

2133.82101 **1358** Methanol mulig resirkulert

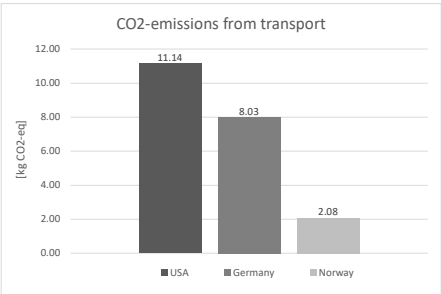
Total transport:

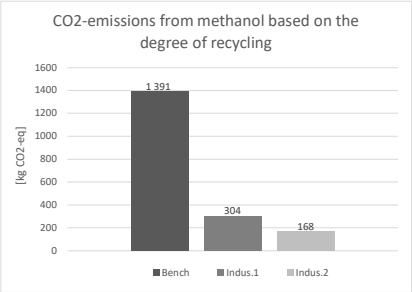
USA	11.14	kg CO2
Germany	8.03	kg CO2
Norway	2.08	kg CO2

Total GWP from methanol:

Bencl	1390.60065
Indus	304.251453
Indus	168.457803

	kg/m3, thickness
1. Trefiberisolasjon:	50, 38
2. Glava glassull:	17.5, 34
3. Sundolitt EPS:	15, 38
4. Sundolitt XPS:	33, 33





Life cycle inventory - With different material composition

Table X: Material 1 (Low) - 0.9 x 1.2 m

Stage	Item	Unit	Value
Product	Lumira® Aerogel LA1000	kg	1.159E+01
	Fiberglass reinforced polymer (FRP) faces	kg	1.493E+00
	Aluminum frame, grid core and spacer	kg	5.250E+01
	Polyamide thermal break	kg	5.105E+00
	Steel screws	kg	1.640E-01
	Electricity	kWh	8.333E+02
Construction Process	Transport		
	USA	tkm	449.3882995
	Germany	tkm	82.62168987
	Norway	tkm	10.62886233

Volume:	0.0756	m³
Increased to "medium" volume		
Weight:	70.859082	kg / 0.2016 m³
	0.07085908	ton

Table X: Material 2 (Medium) - STANDARD FUNCTIONAL UNIT - 1.2 x 2.4 m

Stage	Item	Unit	Value
Product	Lumira® Aerogel LA1000	kg	1.115E+01
	Fiberglass reinforced polymer (FRP) faces	kg	1.558E+00
	Aluminum frame, grid core and spacer	kg	6.740E+01
	Polyamide thermal break	kg	5.999E+00
	Steel screws	kg	1.142E-01
	Electricity	kWh	8.333E+02
Construction Process	Transport		
	USA	tkm	5.468E+02
	Germany	tkm	1.005E+02
	Norway	tkm	1.293E+01

Volume:	0.2016	m³
Weight:	86.217826	kg / 0.2016 m³
	0.08621783	ton

Table X: Material 3 (High) - 1.5 x 6.1 m

Stage	Item	Unit	Value
Product	Lumira® Aerogel LA1000	kg	1.024E+01
	Fiberglass reinforced polymer (FRP) faces	kg	1.597E+00
	Aluminum frame, grid core and spacer	kg	9.769E+01
	Polyamide thermal break	kg	8.558E+00
	Steel screws	kg	8.574E-02
	Electricity	kWh	8.333E+02
Construction Process	Transport		
	USA	tkm	749.4582674
	Germany	tkm	137.7906559
	Norway	tkm	17.72607066

Volume:	0.6405	m³
Decreased to "medium" volume		
Weight:	118.173804	kg / 0.2016 m³
	0.1181738	ton

MATERIAL 2 - MIDDLE, STANDARD FU

Panel dimentions	Length			Volume		
Thickness	70	mm	0.070 m	0.201600 m³		
Width	1200	mm	1.200 m			
Hight	2400	mm	2.400 m			
Perimeter	7176	mm	7.176 m			
Areal	2880000	mm²	2.880 m²			

Skrue: 1 per 24 cm	
W:	5
L:	8
Total skruer:	26

Frame	Areal			Volume		Percentage of total volume	Weight [kg]
Aluminium	483.03	mm²	0.0004830 m²	0.003466 m³		1.72 %	9.358802856
Screw	127.372	mm²	0.0001274 m²	0.000015 m³		0.01 %	0.114239437
Polyamide (therm.br.)	162.48	mm²	0.0001625 m²	0.001166 m³		0.58 %	1.515743424
Green, Aluminium	572.73	mm²	0.0005727 m²	0.002749 m³		1.36 %	7.42258080

Face Sheet	Thickness			Volume			
Inside + Outside	3	mm	0.003 m	0.008024 m³		3.98 %	1.557765771

Grid Core	Width / areal			Volume			
Grid frame	15	mm	0.015 m	0.018746 m³		9.30 %	50.61401899
Polyamide (therm.br.)	162.48	mm²	0.000162 m²	0.003449 m³		1.71 %	4.483657154
Aerogel	67	mm	0.067 m	0.163986 m³		81.34 %	11.1510176

Aluminium total:	**67.39540264**
Polyamide total:	5.999400578
TOTAL weight:	86.21782603

MATERIAL 1 - LOW

Panel dimentions	Length			Volume		
Thickness	70	mm	0.070 m	0.075600 m³		
Width	1200	mm	1.200 m			
Hight	900	mm	0.900 m			
Perimeter	4176	mm	4.176 m			
Areal	1080000	mm²	1.080 m²			

Skrue: 1 per 24 cm	
W:	5
L:	1.8
Total skruer:	14

Frame	Areal			Volume		Percentage of total volume	Weight [kg]
Aluminium	483.03	mm²	0.0004830 m²	0.002017 m³		2.67 %	5.446259856
Screw	127.372	mm²	0.0001274 m²	0.000008 m³		0.01 %	0.061513543
Polyamide (therm.br.)	162.48	mm²	0.0001625 m²	0.000679 m³		0.90 %	0.882071424
Green, Aluminium	572.73	mm²	0.0005727 m²	0.001031 m³		1.36 %	2.78346780

Face Sheet	Thickness			Volume			
Inside + Outside	3	mm	0.003 m	0.002885 m³		3.82 %	0.560050717

Grid Core	Width / areal			Volume			
Grid frame	15	mm	0.015 m	0.004244 m³		5.61 %	11.45841163
Polyamide (therm.br.)	162.48	mm²	0.000162 m²	0.000794 m³		1.05 %	1.032256994
Aerogel	67	mm	0.067 m	0.063943 m³		84.58 %	4.348123872

Aluminium total:	19.68813928
Polyamide total:	1.914328418
TOTAL weight:	26.57215583

MATERIAL 3 - HIGH

Panel dimentions	Length			Volume		
Thickness	70	mm	0.070 m	0.640500 m³		
Width	1500	mm	1.500 m			
Hight	6100	mm	6.100 m			
Perimeter	15176	mm	15.176 m			
Areal	9150000	mm²	9.150 m²			

Skrue: 1 per 24	6.3
W:	23
L:	62
Total skruer:	

Frame	Areal			Volume		Percentage of total volume	Weight [kg]
Aluminium	483.03	mm²	0.0004830 m²	0.007330 m³		1.14 %	19.79225086
Screw	127.372	mm²	0.0001274 m²	0.000035 m³		0.01 %	0.27241712
Polyamide (therm.br.)	162.48	mm²	0.0001625 m²	0.002466 m³		0.38 %	3.205535424
Green, Aluminium	572.73	mm²	0.0005727 m²	0.006987 m³		1.09 %	18.86572620

Face Sheet	Thickness			Volume			
Inside + Outside	3	mm	0.003 m	0.026138 m³		4.08 %	5.074522044

Grid Core	Width / areal			Volume			
Grid frame	15	mm	0.015 m	0.100636 m³		15.71 %	271.7182357
Polyamide (therm.br.)	162.48	mm²	0.000162 m²	0.018449 m³		2.88 %	23.98417632
Aerogel	67	mm	0.067 m	0.478458 m³		74.70 %	32.53516067

Aluminium total:	**310.37621277**
Polyamide total:	27.18971175
TOTAL weight:	375.44802435

DATA FROM EIBROWSER - LCA

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.636387258
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.028289407
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.008945124
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.000122055
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.191067032
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.004899365
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		7.19626E-05
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.023790102
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		1.90E-07
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000745778
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.002075805
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.002023272
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		9.72831E-05

Methanol - Market for methanol - methanol/market for methanol/GLO/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		2.090456256
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.404978866
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.012268264
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.000189475
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.471048921
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.011653879
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.00025178
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.051681078
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		3.22E-07
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.002521702
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.003982123
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.006602866
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000425597

Ammonia, liquid - Market for ammonia, liquid/RoW/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		4.830171073
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		1.43750458
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.056469294
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.002648252
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		2.364937171
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.058510666
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.001043483
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.145647446
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		7.74E-07
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.00950971
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.016570976
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.019629142
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000828283

Tetraethyl orthosilicate - Market for tetraethyl orthosilicate/GLO/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.245166632
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.050179735
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.00560834
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.000254163
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.170707863
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.005268123
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		9.5831E-05
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.002674419
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		2.65E-08
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000449012
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000599701
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.001465599
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		7.17593E-06

Nitrogen, liquid - Market for nitrogen, liquid/RER/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		8.823613727
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		1.415642641
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.028578424
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.000880119
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.656425361
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.02589147
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.007096837
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.021534593
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		1.68E-07
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.011515606
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.022477815
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.030298608
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000152075

Glass fibre reinforced plastic, polyamide, injection moulded - Market for .../GLO/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		5.064189491
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.896181315
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		2.550554454
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.001890816
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		2.207070879
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		2.192847722
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.000989432
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.191671301
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		4.00E-07
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.012179427
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.016835729
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.025825567
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000280043

Aluminium, cast alloy/market for aluminium, cast alloy/GLO/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		1.620133867
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.346716737
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.077828177
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.001669169
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		2.713947386
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.075735736
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.000399349
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		1.397715244
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		7.01E-08
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.007310875
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.008102905
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.007203159
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000254203

Steel, low-alloyed/market for steel, low-alloyed/GLO/kg

name		unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.000545312
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.000109858
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		8.86E-06
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		3.06E-07
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.000307178
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		8.36E-06
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		1.56807E-07
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		1.05549E-05
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		1.03E-10
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		1.55751E-06
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		1.81E-06
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		2.52E-06
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		4.48605E-08

Tap water/market group for tap water/GLO/kg

TRAIN

name	Transport, freight train/market group for freight train/GLO/metric ton*km	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.048359395
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.012374178
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000469725
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		1.40468E-05
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.014978518
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.000449983
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		2.00429E-05
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.002725292
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		5.36E-09
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000176012
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000498189
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.00033701
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		3.15558E-06

SHIP

name	Transport, freight, sea, transoceanic ship/market for.../GLO/metric ton*km	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.011238639
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.003486849
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		4.36934E-05
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		1.54E-06
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.001366151
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		6.73922E-05
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		6.17031E-06
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		9.35676E-05
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		1.79E-09
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		7.12862E-05
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000167635
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.000219879
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		4.34098E-07

TRUCK

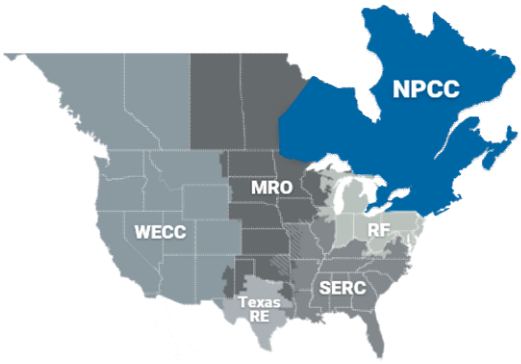
name	Impacts of transport, freight, lorry 16-32 metric ton, EURO6/market for .../RER/metric ton*km	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.161080147
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.055888469
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.000651282
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		1.3342E-05
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.045135367
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.001060926
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		1.34175E-05
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.002199002
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		2.96821E-08
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000216791
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000379031
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.000357212
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		7.23793E-05

Norway

name	Electricity, low voltage/market for electricity, low voltage/NO/kWh	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.031722905
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.002943334
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.016751816
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		2.42855E-05
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.046165227
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.014497626
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		8.74174E-06
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.007980932
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		2.92E-09
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		6.04042E-05
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		7.13262E-05
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.000135942
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		4.57564E-06

Germany

name	Electricity, low voltage/market for electricity, low voltage/DE/kWh	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.605630296
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.130641227
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.030986581
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		0.000885715
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.572231247
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.028036365
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		0.000313436
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.011844917
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		2.94E-08
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000704558
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000817793
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.003514047
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		2.47709E-05

USA

name	Electricity, low voltage/market for electricity, low voltage/NPCC, US only/kWh	unit		value
ReCiPe Midpoint (H) V1.13; climate change; GWP100; kg CO2-Eq		kg CO2-Eq		0.312861531
ReCiPe Midpoint (H) V1.13; fossil depletion; FDP; kg oil-Eq		kg oil-Eq		0.01981536
ReCiPe Midpoint (H) V1.13; freshwater ecotoxicity; FETPinf; kg 1,4-DC.		kg 1,4-DC.		0.019557373
ReCiPe Midpoint (H) V1.13; freshwater eutrophication; FEP; kg P-Eq		kg P-Eq		9.2336E-05
ReCiPe Midpoint (H) V1.13; human toxicity; HTPinf; kg 1,4-DC.		kg 1,4-DC.		0.102751351
ReCiPe Midpoint (H) V1.13; marine ecotoxicity; METPinf; kg 1,4-DB.		kg 1,4-DB.		0.016013937
ReCiPe Midpoint (H) V1.13; marine eutrophication; MEP; kg N-Eq		kg N-Eq		7.66965E-05
ReCiPe Midpoint (H) V1.13; metal depletion; MDP; kg Fe-Eq		kg Fe-Eq		0.009990674
ReCiPe Midpoint (H) V1.13; ozone depletion; ODPinf; kg CFC-11.		kg CFC-11.		6.42E-08
ReCiPe Midpoint (H) V1.13; particulate matter formation; PMFP; kg PM10-Eq		kg PM10-Eq		0.000506972
ReCiPe Midpoint (H) V1.13; photochemical oxidant formation; POFP; kg NMVOC-.		kg NMVOC-.		0.000490704
ReCiPe Midpoint (H) V1.13; terrestrial acidification; TAP100; kg SO2-Eq		kg SO2-Eq		0.001347742
ReCiPe Midpoint (H) V1.13; terrestrial ecotoxicity; TETPinf; kg 1,4-DC.		kg 1,4-DC.		3.6221E-05