

HÅG H04 4400

**HÅG**



Figure 1

**Environmental Indicators. From raw material extraction to HÅG's factory gate:**

Global warming:	53 kg CO <sub>2</sub> .equ.
Energy consumption:	1021 MJ
Amount of recycled materials:	39 %
Guarantee period:	10 yr

Information about the product:	Office Chair
Functional unit:	Sitting solution, produced and maintained for 15 years.
Scope of assessment:	This environmental declaration covers the product's life cycle from raw material extraction until the finished seating solution, incl. use & maintenance. The user phase is represented by a use scenario in Southern Germany. A scenario for disposal is presented.
Year of study:	2007
Data:	Specific data: 2006, Specific database data: Late 1990s to 2006. (See Figure 5)
Expected market area:	Europe & U.S.A.
Company contact:	Carl P. Aaser, Tel: + 47 22 59 59 10, e-mail: carl@hag.no

NEPD nr: **035E**

Approved according to ISO14025, §8.1.4

*Björn Sævi*

Valid until: 14 .05.2011

**Verification of data:**

Independent verification of data and other environmental information has been carried out by Senior Research Scientist Mie Vold in accordance with ISO14025, §8.1.3.

*Mie Vold*

**Declaration compiled by:**

MSc. Guro Nereng



**PCR:**

Product Category Rules for seating solution (Seating, 2005). PCR approved by the Norwegian EPD Foundation's verification committee.

**About EPD:**

EPDs from other program operators than the Norwegian EPD Foundation may not be comparable.

**Information about the producer:**

HÅG asa  
Fridtjof Nansens vei 12  
Postboks 5055, Majorstuen  
N-0301 OSLO, Norway  
Org.nr.: NO-928902749  
ISO 14001 certified by Dovre Sertifisering (NO-S-0000016).  
HÅG's Environmental Management System includes procedures for collection of LCA data and EPD development.

## Product Specification

Table 1

	Mass kg/seating solution	Share %	% included in the analysis	% from suppliers with a certified Environmental Management System*	% of components with EPD*	System boundaries (see the last page for more information)	Hazardous content
Steel	4,73	25,3 %				A-G	The sitting solution meets the following minimum emissions requirements in the Greenguards certification: Formaldehyde: < 0.025 ppm (< 0.03 mg/m <sup>3</sup> ) (Greenguard certificate).  It has not been possible to obtain data on the content of brominated flame retardants & heavy metals. These chemicals have not been detected in HÅG's production.
Aluminium	3,79	20,3 %				A-G	
Other metals	0,123	0,7 %				A-G	
PUR	1,51	8,1 %				A-G	
Plastic	4,64	24,8 %				A-G	
Wood	0	0 %					
Textiles	0,287	1,5 %				A-G	
Cardboard	1,78	9,5 %				A-G	
Various	1,83	9,8 %				A-G	
<b>Total</b>	<b>18,7</b>	<b>100 %</b>	<b>99,5 %</b>	<b>61,3 %</b>	<b>0,03 %</b>		

\* In % of analysed mass, input to the assembly department at HÅG

# Resource Consumption

## Material resources

Table 2

Material resources		Unit	Raw materials production & processing	Transport of components to HÅG	Processing & assembly at HÅG	User phase	Total	Comments
Recycled, renewable resources	Recycled paper/cardboard	kg/seating solution	0,46			0,015	0,47	
	Recycled textiles	kg/seating solution	0,067			0,067	0,13	
New, renewable resources	Water	kg/seating solution	2 412	0,91	18	127	2 558	Including process & cooling water. Not including turbine water.
	Biomass as a raw material	kg/seating solution	0,77	1,2E-04	4,3E-04	9,9E-03	0,78	
Recycled, non-renewable resources	Recycled steel	kg/seating solution	3,34				3,3	
	recycled aluminium	kg/seating solution	3,18				3,2	
	recycled copper	kg/seating solution						
	recycled plastic	kg/seating solution	0,35			0,015	0,35	
New, non-renewable resources	Iron	kg/seating solution	4,2	1,4E-03	7,9E-03	4,0E-03	4,2	
	Bauxite	kg/seating solution	0,81	2,7E-06	2,0E-03	1,1E-03	0,81	
	Limestone	kg/seating solution	2,2	1,8E-03	0,027	0,023	2,2	
	Minerals, sand & stone	kg/seating solution	6,7	6,7E-03	0,019	0,051	6,7	
	Copper (in ore)	kg/seating solution	7,0E-03	2,9E-06	9,1E-05	3,6E-04	7,5E-03	
	Coal as a raw material	kg/seating solution	5,9E-03		3,3E-03	2,8E-04	9,5E-03	
	Oil as a raw material	kg/seating solution	3,4		3,4E-04	2,0E-03	3,4	
Unspecified		kg/seating solution					0,78	Water is not included in this calculation in order to make it more precise.
		%					2,8 %	
<b>Total</b>		<b>kg/seating solution</b>					<b>27,9</b>	All resources except for air and water.

## Land use and water resources

Land use has not been quantified. Water consumption is included in Table 2.

## Energy resources

Figure 2. Percent energy carrier distribution, in total and for each life cycle phase.

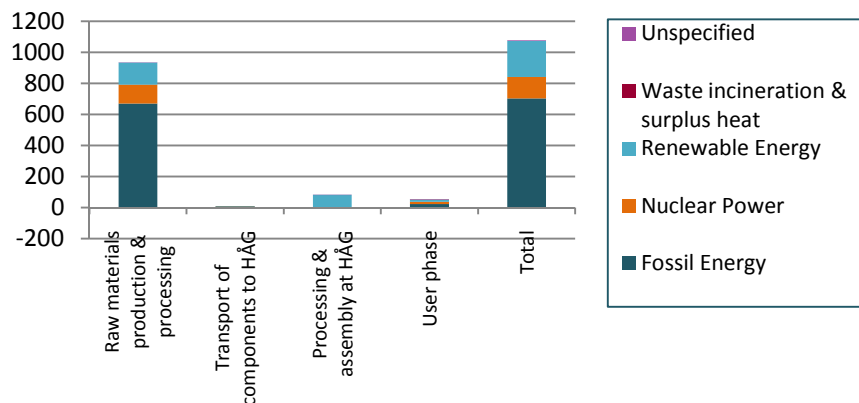


Table 3: Energy consumption specified for the different energy carriers and life cycle stages

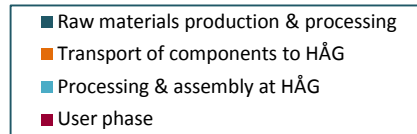
Energy resources		Unit	Raw materials production & processing	Transport of components to HÅG	Processing & assembly at HÅG	User phase	Disposal	Total	Comments
Fossil Energy	Coal	kg/seating solution	217	1,3E-01	0,17	8,5	See "Treatment of waste from the final product"	226	Including lignite
	Oil	kg/seating solution	177	7,7	0,99	6,4		193	
	Natural gas	kg/seating solution	271	0,14	0,68	7,4		279	
	Peat	kg/seating solution	3,8	-	1,9E-03	0,8		4,6	
	Sulphur	kg/seating solution	0,23	1,2E-07	3,1E-05	2,6E-04		0,23	
Nuclear Power		kg/seating solution	123	0,16	0,21	15		139	
Renewable Energy	Biomass	kg/seating solution	42	3,6E-03	0,020	4,0		46	
	Hydro power	kg/seating solution	94	0,091	80	7,4		181	
	Wind power	kg/seating solution	5,6	-	5,8E-03	1,1		6,8	
	Solar power	kg/seating solution	0,010	-	5,0E-05	1,3E-03		0,012	
Geothermal energy		kg/seating solution	0,167	-	-	4,0E-07		0,17	
Various	Waste incineration & surplus heat	kg/seating solution	-5,9	-	-	0,60		-5,3	
Unspecified		kg/seating solution	2,7	-	0,010	0,35		3,1	Including any use of energy with hydrogen as the energy carrier
<b>Total</b>		<b>kg/seating solution</b>	<b>931</b>	<b>8,3</b>	<b>82</b>	<b>52</b>		<b>1 072</b>	

The consumption is calculated based on the NordPool el. mix in the nordic countries (except if the companies buy certified renewable electricity).

# Emissions and Environmental Impacts

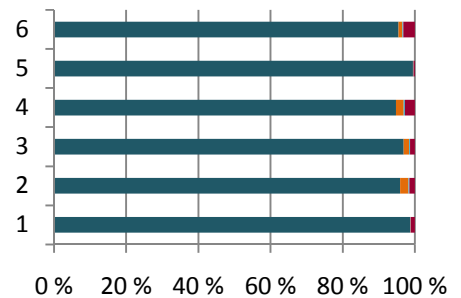
**Environmental Impacts** Table 4

	Indicator	Unit	To the factory gate	User phase
1	Global warming potential, 100 yrs	kg CO2 equ./seating solution	53	1,7
2	Ozone depletion potential	kg CFC-11 equ./seating solution	5,5E-05	1,8E-07
3	Acidification potential	kg SO2 equ./seating solution	0,23	6,4E-03
4	Fotochemical oxidation potential	kg ethene equ./seating solution	0,048	6,7E-04
5	Eutrophication potential	kg phosphate equ./seating solution	0,036	5,4E-04
6	Heavy metals, EI 95	kg Pb equ./seating solution	7,0E-04	8,1E-06



**Percent distribution of environmental impact for each life cycle phase**

Figure 3



**Waste and the most significant emissions, kg** Table 5

Emission		Unit	Raw materials production & processing	Transport of components to HÅG	Processing & assembly at HÅG	User phase	Disposal	Total	Comments
Emissions to air	CO2 (fossil)	kg/seating solution	45	0,59	0,11	1,7	See "Treatment of waste from the final product"	47	
	CH4	kg/seating solution	0,19	1,1E-04	2,1E-04	3,3E-03		0,20	
	N2O	kg/seating solution	1,6E-03	1,5E-03	7,3E-06	3,5E-05		1,6E-03	
	NOx	kg/seating solution	0,10	6,3E-03	6,0E-04	2,9E-03		0,11	
	SOx	kg/seating solution	0,14	1,5E-03	3,6E-04	4,1E-03		0,14	
	VOC	kg/seating solution	0,018	1,1E-03	5,1E-05	6,1E-04		0,020	
	CO	kg/seating solution	0,24	2,4E-03	2,2E-04	1,0E-03		0,24	
Dioxin	kg/seating solution	4,3E-11	3,4E-14	3,1E-14	2,5E-12	4,6E-11			
Emissions to water	Water to waste treatment	kg/seating solution	26	-	14,57	0,019		40	
	COD	kg/seating solution	0,14	0,14	3,8E-04	4,1E-04		0,14	
	Tot-N	kg/seating solution	4,0E-03	5,4E-07	2,1E-06	9,3E-06		4,0E-03	
	Tot-P	kg/seating solution	2,0E-03	1,8E-08	2,4E-07	6,0E-08		2,0E-03	
	Dioxin	kg/seating solution	6,0E-13	-	-	6,3E-20		6,0E-13	
	Phosphate	kg/seating solution	3,3E-03	3,7E-07	8,1E-06	4,1E-06	3,3E-03		
Waste	Nitrate	kg/seating solution	0,014	7,4E-07	3,1E-06	1,4E-05	0,014		
	waste to material recycling	kg/seating solution	0,85	-	0,95	0,030	1,8	Including reuse	
	waste to energy recovery	kg/seating solution	0,22	-	0,25	0,026	0,50		
	waste to incineration	kg/seating solution	0,046	-	-	2,5E-06	0,046	Without energy recovery	
	waste to landfill	kg/seating solution	2,7	-	6,2E-03	0,055	2,8		
	Hazardous waste	kg/seating solution	0,55	3,5E-05	0,64	3,6E-03	1,2	Including radioactive waste and slag/ashes.	
Other waste	kg/seating solution	0,90	3,6E-03	7,6E-03	3,6E-03	0,91	Unspecified waste		

"Processing and assembly at HÅG" also includes emissions from production of the energy that is used in HÅG's production.

## Additional Information

The Environmental Declaration has been compiled based on the Product Category Rules (PCR) for the product category seating solutions (2005). This declaration fulfills the requirements in the relevant product category rules.

In accordance with the PCR the furniture's lifetime is assumed to be 15 years. However this furniture will normally have a longer technical lifetime. HÅG gives a 10 year guarantee for all of their seating solutions used for up to 8 hours per day.

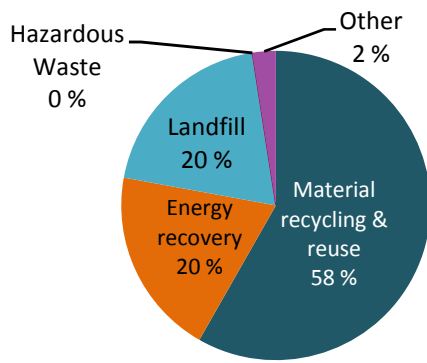
HÅG is committed to environmental protection being an important part of its operations, with focus on the entire value chain of their products. HÅG is ISO 14001 certified and EMAS registered and has Greenguard Indoor Air Quality Certification® under the Greenguard Standard for Low Emitting Products for a number of their seating solutions.

HÅG wants to use recycled and recyclable materials in all of their products and makes conscious choices regarding materials and their content. HÅG endeavours not to use PVC or chromium in new products.

HÅG takes back old office chairs, regardless of brand, with the purchase of new seating solutions. The "Take back" system is also meant to ensure that no HÅG chairs end up on a landfill.

The chair is constructed for a long life, as the mechanical parts and textile cover can easily be changed. The chair is designed such that it can easily be dismantled into pure material fractions for recycling. All of the large plastic parts are marked in accordance with ISO 11469.

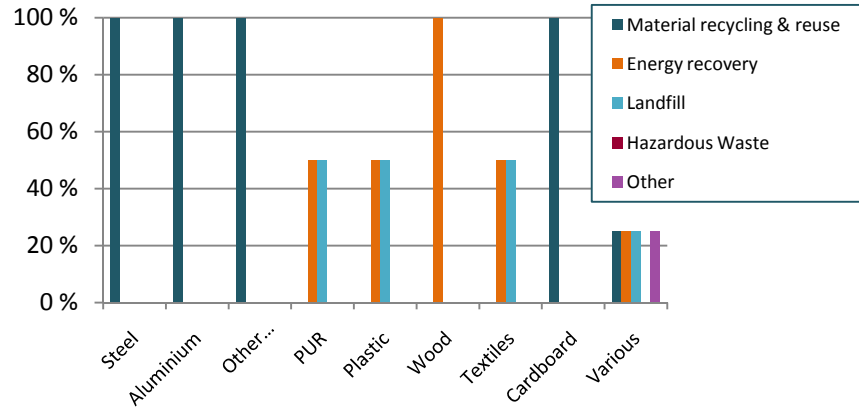
# Treatment Of Waste From The Final Product



**Figure 4: Probable waste treatment for HÅG H04 4400**

HÅG focuses on designs that make dismantling and recycling easier, by using the minimum amount of glue and embedding in its products.

It is currently assumed that the plastic materials go to energy recovery and landfill. None of the components can be viewed as hazardous waste.

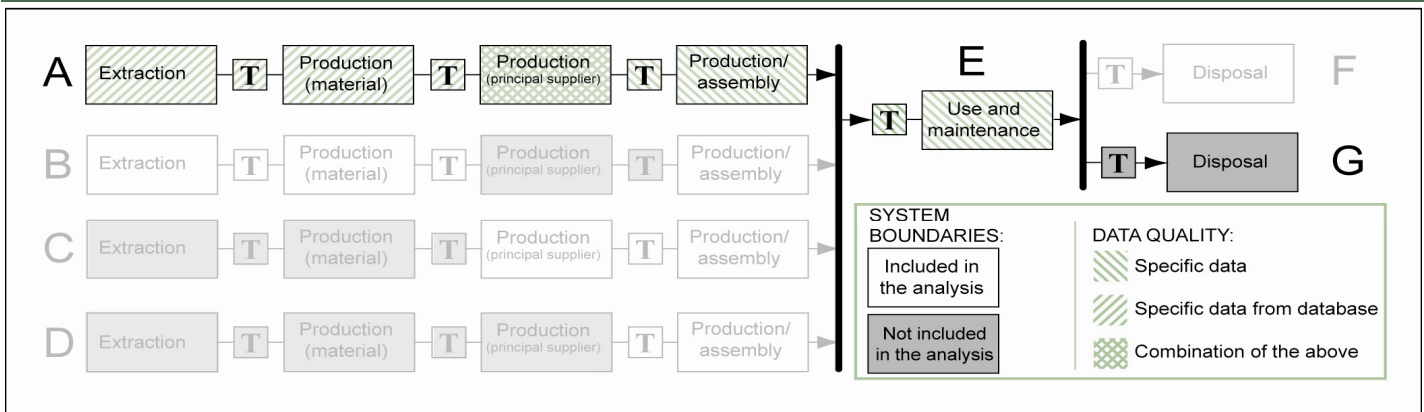


**Figure 5: Probable waste treatment for materials in a seating solution**

The seating solution has a technical lifetime that exceeds the maintenance period of the functional unit (15 years). Most of the chairs are therefore reused by new owners. When the seating solution finally ends up in the Norwegian waste system, the construction is dismantled and the various materials are separated.

Given the Norwegian waste system, 58% of the materials are recycled and reused, while the share of recyclable materials in the seating solution is 97%.

## Methodological Decisions



**Figure 5: System boundaries and data quality.**

### Allocation rules:

- Where virgin materials are used, emissions and energy consumption connected with extraction and production are included.
- Where recycled materials are used in the product, emissions and energy consumption related to the recycling process are included.
- Emissions from incineration are allocated to the product system that uses the recovered energy.
- Emissions from incineration of waste without energy recovery are allocated to the production system where the waste arises.
- For suppliers with multi-output processes the allocation is based on the mass balance, as this information has been consistently available from suppliers.

### Energy:

- All emissions and consumption of resources related to the production of energy carriers used are included. Literature data has been used for

this.

- The electricity consumed is assumed to be from the Nordpool mix in the Nordic countries, except for the companies that buy certified renewable electricity.

### System boundaries:

See Figure 5 and Table 1. Transport upstream is included in "Production (material)".

### Use:

The use phase is represented by a scenario for use in Southern Germany. Transport to the customer, vacuum cleaning of the textiles every other year and a textile change once in the maintenance period are included. Washing the metal and plastic is not included. The PCR does not provide detailed guidelines for what should be included in the use phase. The assumptions made are based on experience from office-based companies.

## References

Greenguard certificate for H04 4400:

<http://www.greenguard.org/DesktopModules/GGCertificationPrint.aspx?productId=2793>

The Norwegian EPD Foundation (2005): *Product-Category Rules (PCR) for preparing an Environmental Product Declaration (EPD) for product group Seating*

ISO 14040:2006 *Environmental Management - Life cycle assessment- Principles and framework.*

ISO 14044:2006 *Environmental Management - Life cycle assessment- Requirements and guidelines.*

ISO 14025:2006 *Environmental labels and declarations - Type III environmental declarations - Principles and procedures.*

Nereng, G. and Modahl, I. (2007): STØ report, OR 23.07: "Life cycle data for seating solutions by HÅG. Background data for environmental declarations (EPD) of 6 seating solutions" (Norwegian language).