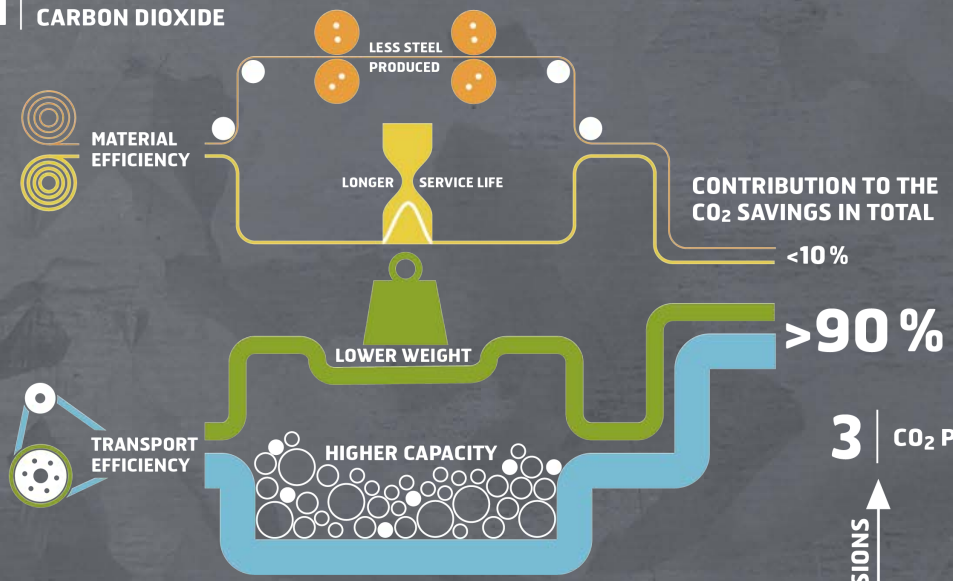
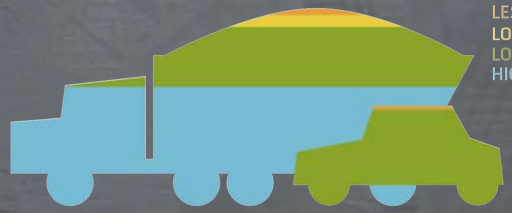
SSAB EcoUpgraded

1 | HOW TO SAVE CARBON DIOXIDE



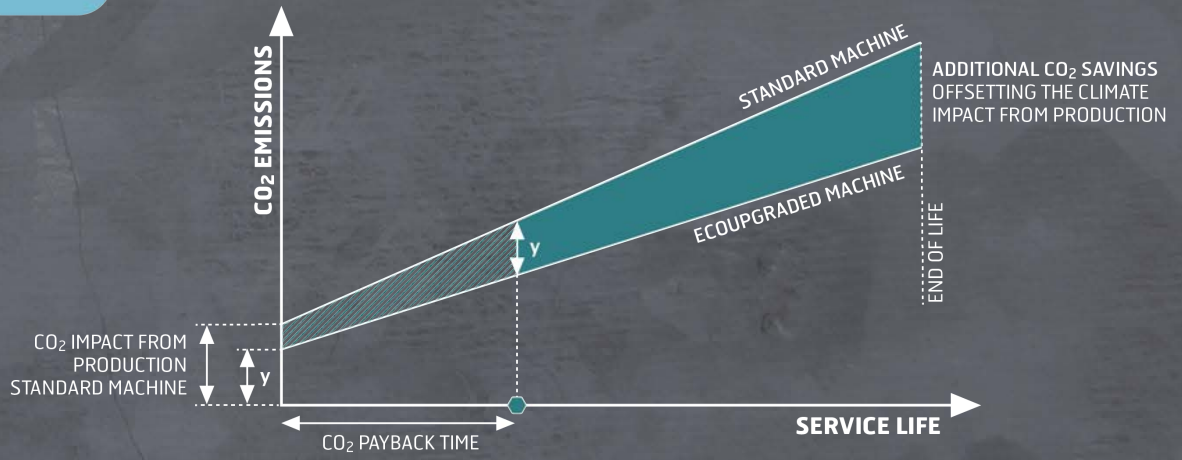
2 | BASKET OF CO_2 SAVINGS



WEIGHT CRITICAL DESIGN
LESS STEEL PRODUCED
LONGER SERVICE LIFE
LOWER WEIGHT
HIGHER CAPACITY

NON-WEIGHT CRITICAL DESIGN
LESS STEEL PRODUCED
LOWER WEIGHT

3 | CO_2 PAYBACK TIME



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From the CO_2 payback time and onwards, every extra hour brings additional savings.

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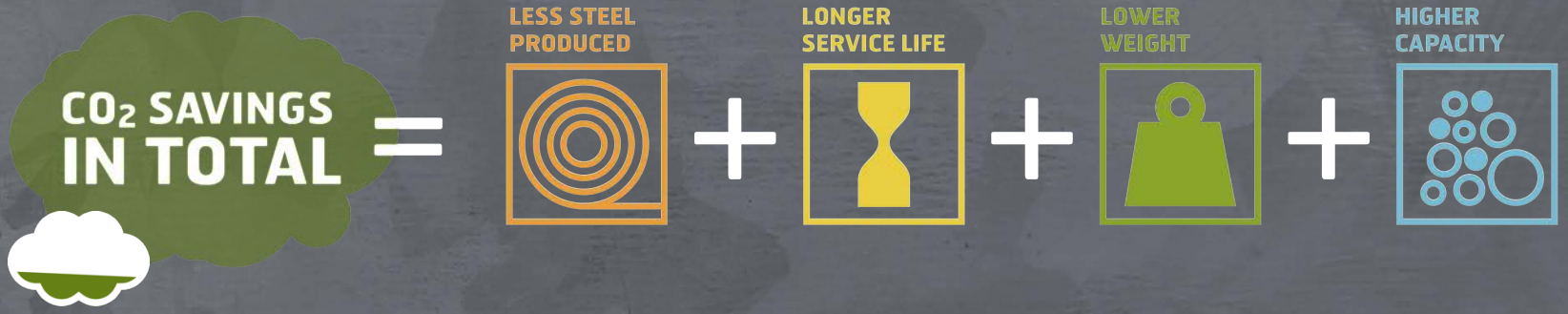
SSAB EcoUpgraded



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CO_2 SAVINGS IN TOTAL =

LESS STEEL PRODUCED

With high strength steel, the machine can be designed lighter.

IMPACT: Every ton less iron ore-based steel saves approx. 2 tons CO_2*.

+

LONGER SERVICE LIFE

With wear-resistant high strength steel, the machine can last longer.

IMPACT: Extended lifetime results in reduced impact of CO_2 emissions from production. If the lifespan is doubled, CO_2 emissions over the product lifecycle is only half.

+

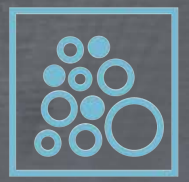
LOWER WEIGHT

With lower weight, the machine will need less fuel for the same work.

IMPACT: Every 1000 liters of fuel not used saves 3 tons of CO_2.

+

HIGHER CAPACITY



When a vehicle is lighter its payload can be increased, resulting in fewer trips for the same transported load.

IMPACT: Every percent of increased load results in the same percentage of fuel and CO_2 savings.

*) This calculation excludes upstream data before iron and steel production. It has, however, no significant impact on the total savings results.

CO_2 PAYBACK TIME = **SERVICE LIFE TIME** × $\dfrac{\text{$CO_2$ EMISSIONS FROM PRODUCTION} - \text{CO_2 SAVINGS FROM LESS STEEL PRODUCED}}{\text{CO_2 SAVINGS FROM LONGER LIFETIME} + \text{CO_2 SAVINGS FROM LOWER WEIGHT} + \text{CO_2 SAVINGS FROM HIGHER CAPACITY}}$

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“Less is more – higher load in every trip”

Savings on CO_2

LESS STEEL PRODUCED

LOWER WEIGHT

HIGHER CAPACITY

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SSAB ECO UPGRADED

TRAILER

In this scenario 1,050 kg of Strenx 700 high strength steel replaces 1,500 kg of conventional 355 MPa steel. This means a weight reduction of 30% for the upgraded parts. The maximum allowed total vehicle weight is 40 tons, and with this upgrade the load capacity is increases by 2%, from 26 tons to 26.5 tons, reducing the fuel consumption per transported ton of cargo.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.39 L/km
Fuel consumption, unladen	0.24 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	12 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	450 kg
Total weight upgraded parts	1,050 kg
Curb weight*	14,000 kg
Total payload*	26,000 kg
Maximum weight*	40,000 kg

*) Valid for the whole tractor-trailer vehicle.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
18	10	5,700
TONS/LIFETIME	MONTHS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Lift your payload”

TRUCK WITH LOADER CRANE

In this scenario 1,125 kg of Strenx 700 high strength steel replaces 1,500 kg of 500 MPa steel in a loader crane. In addition 1,275 kg of 500 MPa steel replaces 1,500 kg of 355 MPa steel in the truck chassis. This means a weight reduction, for the upgraded parts, of 25% in the crane and 15% in the truck. In total a weight reduction of 600 kg is achieved, which increased the load capacity, resulting in higher fuel efficiency and transport efficiency.

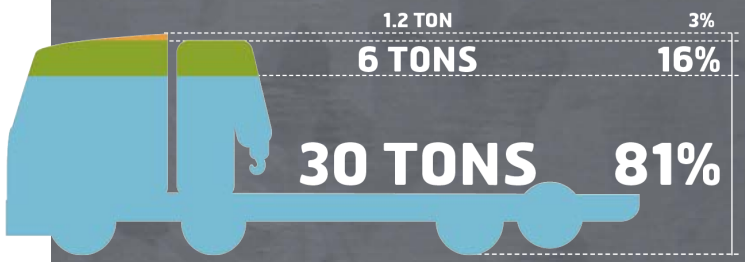
	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.39 L/km
Fuel consumption, unladen	0.31 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	12 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	600 kg
Total weight upgraded parts	2,400 kg
Curb weight*	25,200 kg
Total payload*	13,800 kg
Maximum weight*	39,000 kg

*) Valid for the whole truck vehicle including the loader crane and body.

www.ssab.com/ecoupgraded

Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

Savings on CO_2



LESS STEEL PRODUCED

LOWER WEIGHT

HIGHER CAPACITY

SSAB EcoUpgraded

Together with our customers, SSAB continually upgrades steel and equipment designs. SSAB EcoUpgraded saves CO_2 both in steel production and during the full lifetime of the machine.

From the CO_2 payback time and onwards, every extra hour brings additional savings.

SSAB ECO UPGRADED

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
37	1.2	12,000
TONS/LIFETIME	YEARS	L/LIFETIME

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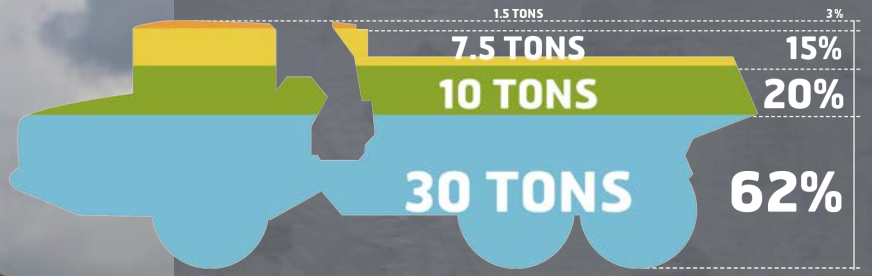
“Articulated savings”

Savings on CO_2



- LESS STEEL PRODUCED
- LOWER WEIGHT
- LONGER SERVICE LIFE
- HIGHER CAPACITY

SSAB EcoUpgraded

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SSAB ECO UPGRADED

ARTICULATED HAULER

In this scenario 2,250 kg of Strenx 700 and Hardox 400 high-strength steel replaces 3,000 kg of conventional steel with 355 MPa strength, reducing the weight of these parts by 25%. In addition we also upgrade the liner package of approximately 1,500 kg from a 400 HBW steel to Hardox 500, which doubles the time between replacements to 8,000 hours.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	40 L/h
Fuel consumption, unladen	20 L/h
Vehicle usage per year	2,000 h/year
Weight critical transports	60 %
Service lifetime	10 years
Steel saved by increased wear resistance	3,750 kg/lifetime
Weight reduction	750 kg
Total weight upgraded parts	2,250 kg
Curb weight	30,000 kg
Total payload	35,000 kg
Maximum weight	65,000 kg

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
49	8	13,500
TONS/LIFETIME	MONTHS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

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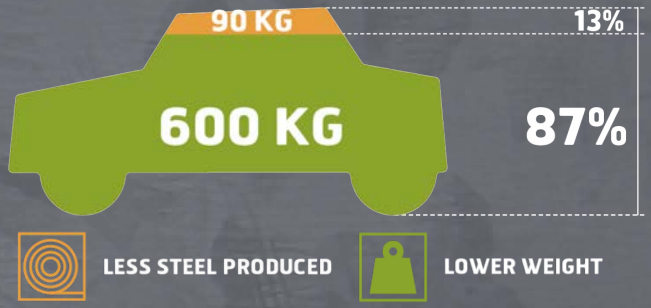
“High strength climate contribution”

Savings on CO_2



SSAB EcoUpgraded

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SSAB ECO UPGRADED

CAR

For a smaller vehicle the savings are smaller. In this scenario, 170 kg of Docol 800 high strength steel replaces 200 kg of 500 MPa material in the chassis. And in the crash components, 85 kg of Docol 1400 steel replaces 100 kg of 1,000 MPa material. This means a total weight reduction of 15% for the upgraded parts, i.e. 45 kgs, which reduces the car’s fuel consumption by approximately 1.3%.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.07 L/km
Fuel consumption, unladen	0.07 L/km
Vehicle usage per year	15,000 km/year
Weight critical transports	0%
Service lifetime	15 years
Steel saved by increased wear resistance	N/A
Weight reduction	45 kg
Total weight upgraded parts	255 kg
Curb weight	1,200 kg
Total payload	N/A
Maximum weight	N/A

Note: Units are in kg.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
690	10	200
KG/LIFETIME	YEARS	L/LIFETIME

www.ssab.com/ecoupgraded

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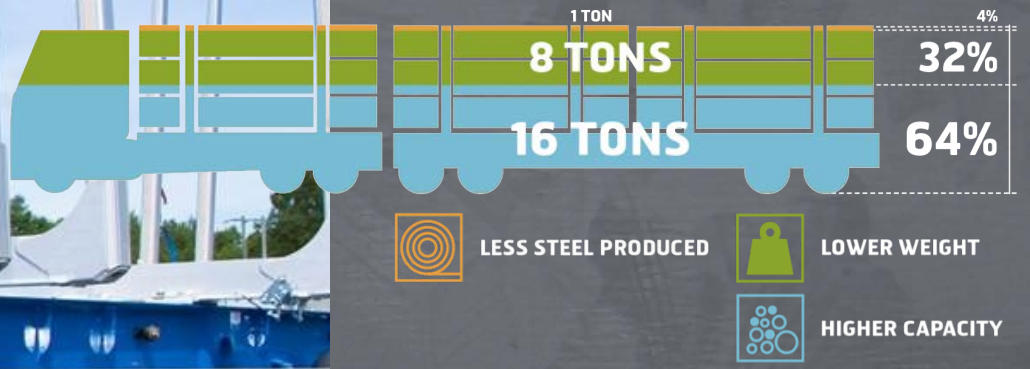
Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

"CO_2 emissions payback in 3 months"

Savings on CO_2



SSAB EcoUpgraded

Together with our customers, SSAB continually upgrades steel and equipment designs. SSAB EcoUpgraded saves CO_2 both in steel production and during the full lifetime of the machine.

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SSAB ECO UPGRADED

TIMBER TRAILER

The longitudinal beams of the trailer were upgraded from yield strength 310 MPa to Strenx 700, saving 350 kg of weight, or 37%, of the upgraded parts. The total weight of the timber trailer could be reduced by an additional 150 kg through changes in design in other parts of the chassis. In total, the trailer´s load capacity was increased by 500 kg.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.71 L/km
Fuel consumption, unladen	0.35 L/km
Vehicle usage per year	175,000 km/year
Weight critical transports	50%
Service lifetime	7 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	500 kg
Total weight upgraded parts	950 kg
Curb weight*	20,000 kg
Total payload*	40,000 kg
Maximum weight*	60,000 kg

*) Valid for the whole truck-trailer vehicle.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
25	3	8,100
TONS/LIFETIME	MONTHS	L/LIFETIME

www.ssab.com/ecoupgraded

SSAB

Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“22 tons of CO_2 savings”

Savings on CO_2

- LESS STEEL PRODUCED
- LOWER WEIGHT
- HIGHER CAPACITY

SSAB EcoUpgraded

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From the CO_2 payback time and onwards, every extra hour brings additional savings.

SSAB ECO UPGRADED

TIPPING TRAILER

In this tipper body, the hardness of the abrasive-resistant steel plates was increased from a 400 HBW steel to Hardox 450, saving 1.3 tons of weight – equivalent to a weight reduction of 30% for the upgraded parts. This means an increase in the trailer’s load capacity from 27 tons to 28.3 tons, or about 5%.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.40 L/km
Fuel consumption, unladen	0.33 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	85%
Service lifetime	6 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	1,300 kg
Total weight upgraded parts	4,500 kg
Curb weight*	17,000 kg
Total payload*	27,000 kg
Maximum weight*	44,000 kg

*) Valid for the whole tractor-trailer vehicle.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
32	1.3	9,700
TONS/LIFETIME	YEARS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Heavy metal getting lighter”

MINING TRUCK BOX

This heavy-duty mining truck was redesigned and upgraded using Hardox 450 in the tipper body. The weight of the tipper body was reduced by 22%. This reduced the weight by 2.5 tons, which increased the load capacity. In addition to this, the life-time of the body is now three times longer than the original, decreasing overall steel consumption and reducing the need for lengthy overhauls.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	220 L/h
Fuel consumption, unladen	120 L/h
Vehicle usage per year	7,300 h/year
Weight critical transports	50 %
Service lifetime	10 years
Steel saved by increased wear resistance	24,500 kg/lifetime
Weight reduction	2,500 kg
Total weight upgraded parts	8,600 kg
Curb weight	69,000 kg
Total payload	91,000 kg
Maximum weight	160,000 kg

www.ssab.com/ecoupgraded

Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

Savings on CO_2

- LESS STEEL PRODUCED
- LOWER WEIGHT
- LONGER SERVICE LIFE
- HIGHER CAPACITY

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CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
1,005	2	317,000
TONS/LIFETIME	MONTHS	L/LIFETIME

SSAB

“Skip every 10th trip”

Savings on CO_2

LESS STEEL PRODUCED

LOWER WEIGHT

HIGHER CAPACITY

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SSAB ECO UPGRADED

SEMI-TRAILER SCRAP BOX

This semi-trailer scrap box was designed to become super light, using laser welded sidewalls with integrated top beam and floor made of Hardox 450. In addition, Strenx 700 material was used in the trailer chassis. This means a total weight reduction of 3 tons compared to similar solutions of standard design. This increases the load capacity by approximately 10%.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.40 L/km
Fuel consumption, unladen	0.33 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	7 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	3,000 kg
Total weight upgraded parts	5,220 kg
Curb weight*	16,000 kg
Total payload*	30,800 kg
Maximum weight*	46,800 kg

*) Valid for the whole tractor-trailer vehicle.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
50	8	14,800
TONS/LIFETIME	MONTHS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Winds of change – less drag, more load”

Savings on CO_2

LESS STEEL PRODUCED

LOWER WEIGHT

HIGHER CAPACITY

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SSAB ECO UPGRADED

ROLL-ON CONTAINERS

These containers were upgraded from 355 MPa standard steel to Hardox 450, increasing the load capacity by 2,100 kg for the total vehicle with a set of three containers. This allows more payload per trip and also reduces the fuel consum-ption for the empty vehicle. The removal of stiffeners on the sides also lowers wind drag, which further reduces the fuel consumption.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.69 L/km
Fuel consumption, unladen	0.35 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	12 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	2,100 kg
Total weight upgraded parts	7,650 kg
Curb weight*	26,700 kg
Total payload*	37,300 kg
Maximum weight*	64,000 kg

*) Valid for the whole truck-trailer vehicle.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
105	1.3	33,600
TONS/LIFETIME	YEARS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Move cargo – not steel”

Savings on CO_2

- LESS STEEL PRODUCED
- LOWER WEIGHT
- LONGER SERVICE LIFE
- HIGHER CAPACITY

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SSAB ECO UPGRADED

SCRAP RECYCLING CONTAINER

By removing stiffeners and using the high load and lifetime performance of Hardox 450, the weight could be reduced by 35% at the same time as the lifetime doubled from 6 years to 12 years.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.34 L/km
Fuel consumption, unladen	0.24 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	12 years
Steel saved by increased wear resistance	4,020 kg/lifetime
Weight reduction	1,400 kg
Total weight upgraded parts	2,620 kg
Curb weight*	12,740 kg
Total payload*	13,260 kg
Maximum weight*	26,000 kg

*) Valid for the truck-container vehicle without a trailer.

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
88	4	25,600
TONS/LIFETIME	MONTHS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Hooked on savings”

Savings on CO_2

LESS STEEL PRODUCED

LOWER WEIGHT

HIGHER CAPACITY

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SSAB ECO UPGRADED

LOADER CRANE

Working on the crane design and moving the longitudinal welds to the neutral layer of the crane arm extension, the yield strength could be increased from 800 MPa to Strenx 1100. Together with a redesign of the stabilizer beam, this saved 114 kg of weight, or around 15% of the upgraded parts. This, in turn, increases the load capacity of the truck, reducing fuel consumption per ton transported.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.32 L/km
Fuel consumption, unladen	0.24 L/km
Vehicle usage per year	100,000 km/year
Weight critical transports	50%
Service lifetime	12 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	114 kg
Total weight upgraded parts	659 kg
Curb weight	16,200 kg
Total payload	11,800 kg
Maximum weight	28,000 kg

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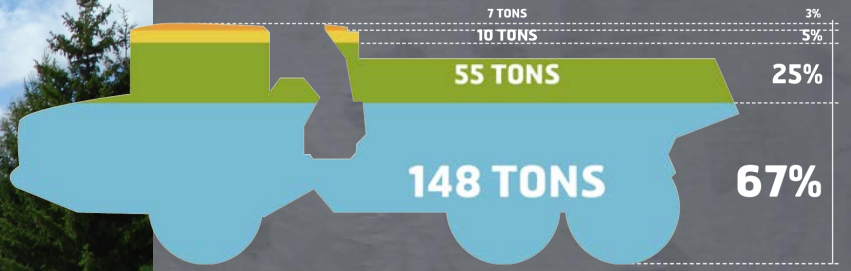
CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
7	1.9	2,300
TONS/LIFETIME	YEARS	L/LIFETIME

SSAB

Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

“Immediate results”

Savings on CO_2



- LESS STEEL PRODUCED
- LOWER WEIGHT
- LONGER SERVICE LIFE
- HIGHER CAPACITY

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SSAB ECO UPGRADED

DUMPER BODY

This new body design is made of Hardox 450 and 500, increasing the dumper’s load capacity by about 11% compared to the original design. It is partly due to the redesign and upgrading of wear liners, saving approximately 80% of their weight.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	40 L/h
Fuel consumption, unladen	20 L/h
Vehicle usage per year	2,000 h/year
Weight critical transports	60%
Service lifetime	10 years
Steel saved by increased wear resistance	5,000 kg/lifetime
Weight reduction	3,700 kg
Total weight upgraded parts	3,500 kg
Curb weight	31,060 kg
Total payload	32,380 kg
Maximum weight	63,440 kg

CO_2 SAVINGS	CO_2 PAYBACK TIME	FUEL REDUCTION
220	0	67,000
TONS/LIFETIME	MONTHS	L/LIFETIME

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Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.

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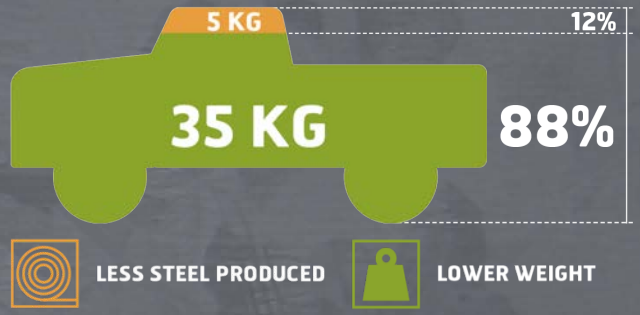
“It’s all in the details”

Savings on CO_2



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CONTROL ARMS

In this pick-up truck, the control arms in the front suspension were upgraded from 340 MPa yield strength to Strenx 700. This reduces the weight of the control arms by 36%, or 2.7 kg. At the same time, static and dynamic as well as fatigue performance was improved – at a lower cost compared to an aluminum solution.

	SSAB EcoUpgraded
Fuel consumption, fully loaded	0.15 L/km
Fuel consumption, unladen	0.14 L/km
Vehicle usage per year	15,000 km/year
Weight critical transports	0%
Service lifetime	15 years
Steel saved by increased wear resistance	0 kg/lifetime
Weight reduction	2.7 kg
Total weight upgraded parts	4.8 kg
Curb weight	2,800 kg
Total payload	700 kg
Maximum weight	3,500 kg

Note: Units are in kg.

www.ssab.com/ecoupgraded

Reference document: Environmental evaluation of steel and steel structures – a handbook produced within The Steel Eco-Cycle project, Jernkontoret, 2013.