

SUSTAINABLE AND CIRCULARITY

Reusage of bespoke load carriers is the sustainable solution





Introduction

Sustainable business in a circular economy. This is crucial for any business. The ever-expanding world population and growing global economy go hand in hand with significant growth in consumption. But the amount of raw materials available to meet this growth in consumption is not increasing. On the contrary, raw materials, such as metals and oil, are being depleted and are therefore becoming more and more expensive. Supply is lagging behind the increasing demand. Every producer is facing this increasingly acute paradox.

Problem definition

Wood is a sustainable raw material. It absorbs CO₂ from the air and stores it. Furthermore, it is a renewable base material, which makes it very popular. The demand for wood is therefore enormous: according to environmental organisations, **15 billion trees are cut down every year, but only 5 billion are planted**. This means that more CO₂ is released into the atmosphere than is captured. And this is pushing up global warming even further. A striking visualisation of deforestation can be found on the website www.globalforestwatch.org.

This problem also affects wooden pallets. Translated into figures: 20 pallets can be made from one tree. One pallet represents 30 kilos of CO₂, which is re-released when burnt. For a customer with 200,000 pallets in circulation, that amounts to 6,600,000 kg of CO₂ on an annual basis if all are burnt. For this, 62,700 solar panels must generate energy for a year. It is therefore of the utmost importance to reuse wooden pallets for as long as possible, thereby reducing the use of new wood.

One sector that uses a lot of wooden pallets and causes high CO₂ emissions is the construction industry. How can these problems be solved sustainably?





Construction material logistics

A lot of environmental gains can be made in the construction sector. The number of pallets used only once should be limited. This reduces CO2 emissions and decreases the cost per pallet. These pallets must not get lost after the goods are delivered to the customer by being left in a warehouse or ending up in the waste container at the construction site. Instead, they should be reused as often as possible. Without loss of quality.

How to organise pallet return in practice

The importance of reusing pallets is indisputable. But putting this into practice is more difficult. There are three reasons for this: after use, the pallets are disposed of in many locations, they belong to different owners and they are often disposed of together with other materials.

Individual pallet collection by each individual building material supplier involves a lot of transport movements in densely populated areas and appears unfeasible for that reason alone. Therefore, a distinction is made between the route via the wholesale/trade and via the DIY channel of the DIY stores.

The success of pallet return hinges on the cooperation within the chain, with each participant taking their own responsibility. Integrated and central control is necessary to properly channel the physical and administrative flows. A coordinator is needed who has the right knowledge of transaction management and the competences to steer everything in the right direction. They devise the system, lead the physical implementation, supervise balance management and control the carriers and depots.

Integrated administration is digital and linked to the operational systems of suppliers and trading parties, but is also available online via a web portal. The coordinator secures implementation through contracts with and the management of subcontractors.

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The physical activities, such as transport, sorting, repair and storage, are outsourced to (regional) market parties. Current partners of suppliers and trade can participate in this. Starting points are the optimal load factor, efficiency and quality of service. This demonstrably leads to CO2 reduction.





Pallet return options

Pallet return via wholesale/trade

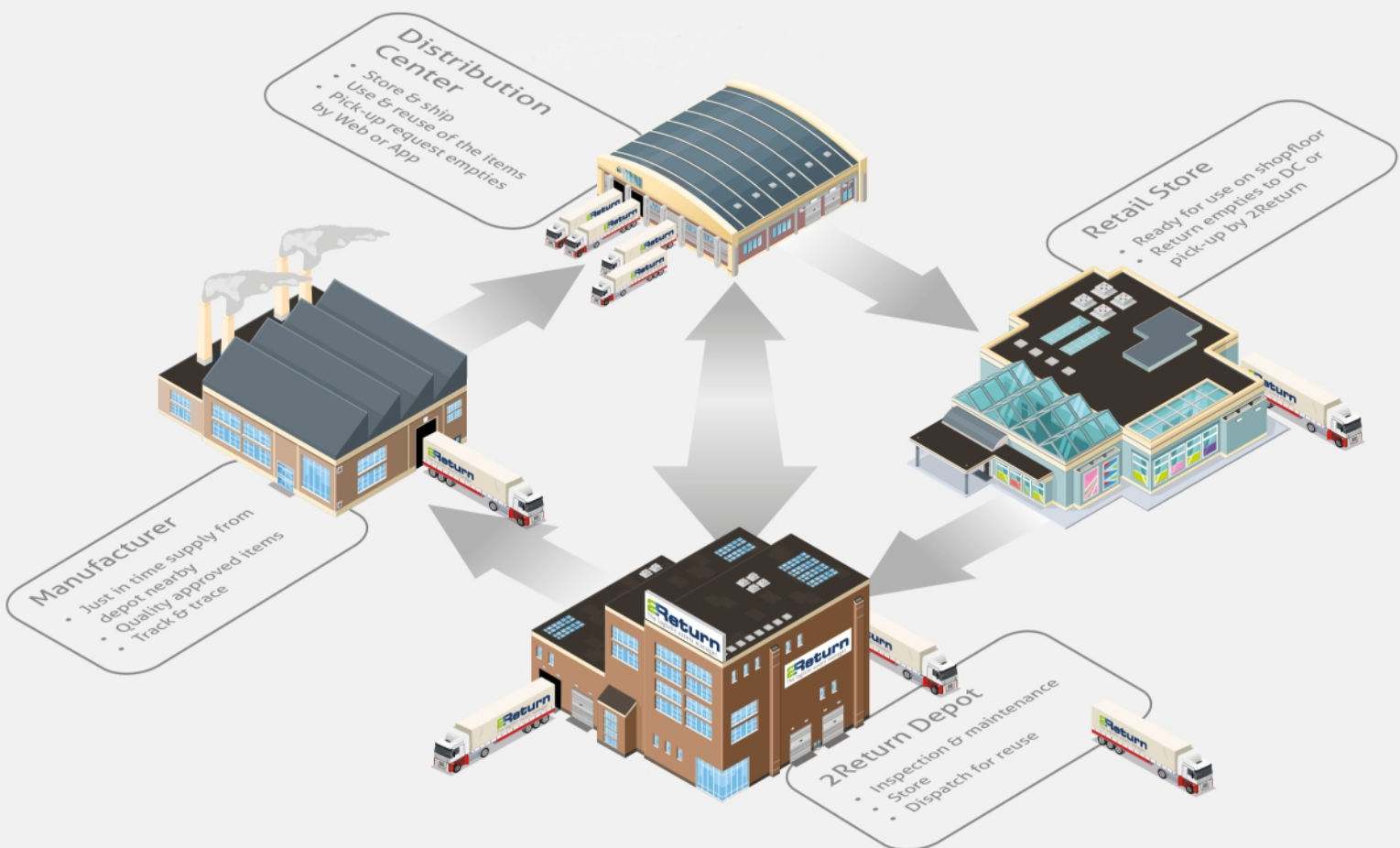
As a logistics service provider, the trade provides a grouped delivery of building materials from multiple suppliers. After use, the contractor or subcontractor returns the pallets to the trade's drop-off point, or the trade collects them from the construction site. As a result, the warehouse/distribution centre of the trade acts as a collection point for empty pallets. From this collection point, all returned pallets are transported to a regional pallet depot.

Pallet return via the DIY channel

Pallets for building materials sold through DIY stores are usually unloaded at the DIY store or the retailer's distribution centre. When the pallet is unloaded at the DIY store or when a customer returns a pallet, it goes back to the distribution centre (together with other packaging and materials). All returned pallets are transported from the distribution centre to a regional pallet depot.

Collection of pallets at a specific location

If the number of returned pallets justifies it or if no other alternative is available, all returned pallets are transported directly from the construction site or location of use to a regional pallet depot.





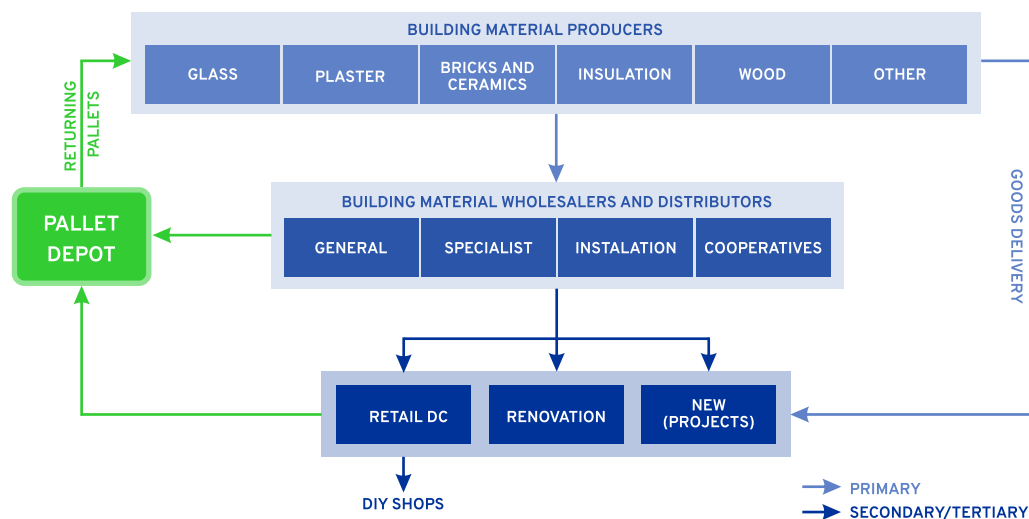
Administration and deposit

The registration of pallets is monitored in an integrated system that starts with the supplier of building materials. An account is created for each trading partner in which a record of the pallet balance is kept. The trading partner account applies to all affiliated building material suppliers. Deposits are refunded through this account.

As soon as goods are delivered, the supplier sends the dispatch information (by EDI/e-mail/in portal): the amount of pallets delivered and to which account they are credited. As soon as the returned pallets arrive at the depot, they are counted and sorted by type and quality for each collection location. These numbers are debited from the account and the receipt data sent separately to the relevant supplier by EDI or another method. In the case of deposit pallets, the supplier refunds the deposit based on this data.

Simplified flow chart

Pallets with goods distributed by the building materials supplier and the return of empty pallets to the collection location:



How does the process work?

1. The supplier sends dispatch information to the coordinator; the outstanding balance is increased by the number of pallets delivered.
2. Route for returning pallets.
 - a. Trading partners retrieve pallets and make them available unsorted for collection at the agreed collection location (warehouse, showroom, depot).
 - b. The contractor makes pallets available unsorted at the construction site, known as the 'collection location' in the system.
3. The collection location enters a pick-up request via the portal or sends an e-mail.
4. In the background, a transport order is sent to the linked carrier which schedules the order. As soon as it is scheduled, a confirmation e-mail or text message is sent to the collection location so they know when pallets will be picked up.



5. The carrier picks up the pallets and delivers them to the pallet depot linked to the collection location.
6. At the pallet depot, the pallets are counted and sorted according to type and quality for each shipment. A confirmation of receipt is sent to the collection location. The number of pallets is deducted from the outstanding balance of the account.
7. The number of pallets returned for each shipment and account is communicated by EDI to the suppliers who, through their ERP system, pay out any deposit due.
8. The depot repairs broken pallets, prepares them for reuse and sends them back in full trucks to the relevant supplier.

Costs of pallet return

The basic principle is that each link in the chain bears its own costs for pallet return and must make agreements about this with the next link.

Base case cost projection & sustainability

The key question for this pallet return concept is, of course: what does it deliver in terms of sustainability and cost reduction? Below is a projection of single use of a pallet compared to multiple use of a pallet. This projection serves to indicate the potential and is based on a number of assumptions that can and may vary for each individual player.

Assumptions (current situation):

- The current pallet type is a beam pallet (plank deck, with vertical beams at the bottom) size 1040x840mm; weighs 10kg and contains 0.022 m³ wood.
- Pallets are currently not reused. 70% of the pallets are transported directly by the contractor or subcontractor from the construction site for recycling. The remaining 30% are returned to the supplier, who then transports the pallets to the recycling company.
- No deposit is charged.
- Purchase price: €7.50
- Pallets delivered: 100,000.

Assumptions (new situation):

- Same pallet type with weighted planks; 0.025 m³ of wood and weighs 11kg.
- Purchase price: €8.50.
- Similar to the current situation, 70% of the pallets are collected at the construction site. And 30% at the dealer's.
- To secure the return, a deposit of €10.00 per pallet is charged. Upon return, €9.00 is credited for an intact pallet and €7.00 for a broken one.
- Collection takes place once a month, with a minimum of 1 loading metre and a defined profile of goods deliveries divided between trade and construction site.



Current situation - current cost reference

The assumption is that no pallets are returned, so the total volume of pallets sent is only used once. The reference costs therefore equal the purchase costs:

Model 01			
Intact pallets	100%	Sent	100,000
Broken pallets	0%	Not recoverable	100,000
Scrap? NC	0%		
Current			
Purchase	100,000	€ 7,50	€ 750,000

New situation - costs with pallet return

The base case assumes 100,000 pallets with the following profile:

Item	<15	15-30	30-45	45-90	>90	Total
No of pallets (%)	4%	5%	11%	15%	65%	100%
Pallets per pickup	6	20	35	65	250	58
# Pallets	4 000	5 000	11 000	15 000	65 000	100 000
# Collections	667	250	314	231	260	1 722

Volumes are divided into 5 classes of the number of pallets per collection. There are smaller addresses where only one stack is picked up, but there are also locations where more pallets are picked up the same time. This includes traders, DIY stores and larger project sites.

The volume spread shows the percentage of the total number of pallets collected in each class. For each class, the number of pallets collected is determined based on the profile, and on that basis the average number of pallets per collection is determined. The model is built and the costs calculated based on this profile.



The assumption is that, in principle, all pallets are returned and a deposit is also applied. A practical set-up is created in which **5%** of the pallets sent are not returned; **15%** of the collected pallets need repair and **3%** of the pallets are damaged beyond repair or are not of the right type (Scrap/No Class).

The simulation model shows the following projected costs in the return model:

Simulation model				
Intact pallets	82%	Sent		100 000
Broken pallets	15%	Not recoverable		5 000
Scrap?NC	3%			
General				
Purchase		100 000	€8,50	€ 850 000
New				
Depreciation	Sent	100 000	€1,21	€121 429
	Not rec.	5 000	€8,50	€42 500
	Scrap/NC	2 850	€8,50	€24 225
2R	Return intact	77 900	€1,89	€146 861
	Return broken	14 250	€4,64	€66 052
	Retour S/NC	2 850	€1,89	€5 373
			Cost per year	€406 440

The set-up indicates that a considerable saving of over **40%** can be made on the reference costs for the situation in which pallets are not returned at all.

The concept states that each party takes its own responsibility in terms of the cost of returns. The assumptions therefore include that end consumers contribute to the costs of returns (€1.00) and repairs (€2.00) through a discount on the deposit paid. Think of it as a kind of environmental tax. This is, of course, a choice of the industry. It is only included here to show its effect. Due to the deposit, the costs of the return system are divided equally between supplier and user.

Deposit				
Charged		100 000	€ -10,00	€ -1 000 000
Credited intact		77 900	€9,00	€701 100
Credited broken		14 250	€7,00	€99 750
Reimbursement of costs from deposit				€ -199 150



Sustainability and the effects of Co2 reduction as a result of the pallet return system

The profile in the simulation model is used to determine the CO₂ emissions. This means that, including the journey to and from the collection point, the average driving distance is 50 km per stop. The empty weight of the tractor/semi-trailer is 3,100kg and the weight of the pallet is 11kg; it contains 0.025m³ wood. The current pallet is not returned and a new pallet made of fresh wood is always purchased.

In terms of environmental impact, recycling through processing as biomass is therefore assumed. The determination of the amount of CO₂ in wood is derived from a calculation made by Centrum Hout:



During incineration, 620 kg of CO₂ is released per m³ of wood. The current reference pallet has a wood content of 0.022m³. Incineration of 100,000 pallets releases 1,364,000 kg of CO₂.

The same assumptions as for the single use model have been used to calculate the CO₂ effect of returns. In addition, some specific assumptions were made to determine the effect of CO₂ emissions during transport for pallet collection. And the CO₂ emissions for the production of the pallet are considered equal and therefore not included in the comparison. An overview of the assumptions:

Starting points	Benelux
Average kilometers per truck	390
Average stops per truck	7,8
Stops per year	1 678
Km/stop	50
Trips per year	215
Km per year	83 895
Pallets per year	100 000
Empty weight of tractor/semi-trailer	3 100 kg
CO ₂ emissions	82 grams/tonnesKm
CO ₂ stored in wood	620 kg/m ³
Cycles (pallet)	7



The CO₂ emissions for transport by tractor unit/semi-trailer are taken from the STREAM report by CE Delft, which calculated this for the Ministry of Transport, Public Works and Water Management for each mode and type of vehicle:

Mode	Vehicle/craft	Type of goods	CO ₂ (g/tkm) (WTW)	PM _v (g/tkm) (WTW)	NO _x (g/tkm) (WTW)
Road	Large van	Medium-heavy	1 153	0,148	5,03
	Medium-heavy truck	Medium-heavy	259	0,017	1,75
	Tractor-semi-trailer	Medium-heavy	82	0,003	0,29
Rail	Electric medium-length	Heavy	10	0	0
	Diesel medium-length	Heavy	18	0,005	0,19
Inland shipping	R.H.C (Rhine-Herne Canal)	Heavy	38	0,017	0,46
	Large Rhineship	Heavy	21	0,008	0,23
Coastal shipping	General Cargo 10-20 dwtk	Heavy	15	0,002	0,25

Based on the assumptions made, the following calculation is made for the base case of 100,000 pallets in a return model.

Pallets	Method	Km	Kg	M ³	Ton/Km CO ₂	Per year
92 125	Recovery	390	11	0,0250	395 324	274 171
7 850	Not rec.	-	11	0,0250	-	121 657
100 000					Kg CO₂ per year	395 846

The CO₂ emissions for transport (collection only) are determined by the weight and format of the pallet, the weight of the tractor unit/semi-trailer and the number of kilometres driven. Since 7,850 pallets are not returned, they have been calculated as single-use.

Taking into account the 7 cycles for the pallet, the total equation looks like this:

7 cycles	
CO ₂ emissions one-off	1 364 000
CO ₂ emissions return concept	395 846
Estimated annual savings	- 968 154 Kg/CO₂
Number of trees required one-off*	5 000
Required number of trees return concept	1 051
Number of trees saved/year	- 3 949

* 1 tree = 20 pallets



The conclusion speaks for itself. Although CO₂ is emitted during the return transport of the pallets, this is more than compensated by the fact that the **pallet can be easily used more than 7 times** before it is incinerated. The use of reusable pallets contributes significantly to reducing CO₂ emissions. This is a broad statement, but given the huge difference, further detailing will not detract from the conclusion that single-use pallets should be abandoned.

Conclusion

It is crucial that the earth's scarce resources are used sparingly. Consumption continues to grow, but raw materials are becoming increasingly depleted.

Focusing on the raw material wood: wood is a sustainable raw material. After all, it captures CO₂ and if enough trees are planted, the supply will never run out. But there is the rub: every year, far more trees are felled than are planted. As a result, CO₂ emissions are constantly increasing.

The magic word to reverse this climate-threatening trend is reuse. For example, wooden pallets can be used several times under certain conditions. They need to be sturdier - i.e. heavier. Heavier pallets do contain more wood, so more CO₂ will be released into the air when they are burnt. But heavier pallets can easily be used 7 times before they reach the end of their service life.

After reuse, they emit significantly less CO₂ per use when burnt than single-use pallets, which contain less wood but are burnt after each use.

How does that work specifically at 2Return?

Vision on sustainability

In order to keep the environment liveable for our children and grandchildren, we must commit to reducing environmental impact as much as possible. We can therefore no longer avoid sustainable living. The Paris Agreement has a clear goal: global warming must remain well below 2 degrees Celsius compared to the period before industrialisation. Trees play a decisive role in achieving this goal; after all, they absorb the CO₂ from the air. The more trees, the better and faster we can achieve these goals. But sustainable does not necessarily mean less: it means that we have to make different choices.

The production of every new product we buy requires the use of energy and raw materials. But why should we keep buying new products when the current ones still fulfil their function perfectly? With a little maintenance and repair, the service life-time can be extended considerably. 2Return contributes to this by bringing bespoke pallets into a circular model, rather than one of single use. And by ensuring that optimum use is made of the pallet and offering it as a raw material for a new product at the end of its service life. CO₂ emissions are reduced thanks to an extensive network of depots where the pallets can be stored, meaning that the number of kilometres driven remains limited.

To achieve this, our company was established in 2010 as a 100% subsidiary of Rotom Europe BV.



Working method

We are specialised in **managing bespoke load carriers flows - for all sectors of industry**. The services focus on the reuse of pallets, boxes, containers and crates. A lot of money can be saved by returning the often expensive packaging instead of destroying it. In addition, packaging lasts longer after inspection, preventive maintenance, repair, cleaning and proper storage.

The collected packaging is stored in depots in the Netherlands, Belgium, Germany, Austria, Poland, Spain, Portugal, Denmark and the United Kingdom. As a result of this high degree of coverage, the transport kilometres and thus the transport costs remain limited. And that, too, is good for the environment.

In concrete terms

The bespoke load carrier is delivered to the customer's production or distribution location. By using the load carrier, the customer ships its products/goods to its own customers. The dispatch information, including delivery address and delivery date, is automatically processed by a smart IT system. The packaging is then returned to a depot, where it is checked, sorted, repaired if necessary, cleaned and stored. After the inspection, the customer receives information about the administrative process. Our web portal provides up-to-date insight into the stocks at the depots and the stocks held by customers. Customers can order the packaging themselves and it is delivered just in time.

We manage standard-size as well as bespoke pallets for specific customers. **These non-standard pallets are often left behind with the customer after single use**, as there is no market demand for them. This is prevented by collecting them from the customer and delivering them back to that customer's production site after inspection/maintenance. In the case of standard-sized packaging, new users are sought through the pool after storage in order to keep costs as low as possible and the environmental benefit as high as possible. With depots and carriers in various European countries, coverage is optimal.

Our services are successfully applied, for example, to suppliers of building materials, packaging and chemical products, which all use a mixture of standard and proprietary non-standard resources. These can be owned by the customer or leased from a third party. 2Return acts on their behalf as the integral packaging manager and coordinator of the returns process.





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