PROJECT SHEET - WASTE2BUILD

The restructuring project of the Bénézet school group in Toulouse began with the selective deconstruction of the existing building, followed by the construction of a new two-story building combining a concrete base with a timber frame.
The building includes teaching areas, a library, a school cafeteria, administrative rooms and CLAE spaces.
The circular-economy approach resulted in an architectural intent based on sobriety, the integration of reused materials, and a bioclimatic design strategy (natural ventilation, solar shading, cooling areas).
The targeted E3C1 performance level was achieved thanks to a geothermal heat pump and 68 kWp of rooftop photovoltaic panels.

Operation Title	**Ecole BENEZET**
Adress	**37 Rue Bernard Bénézet, 31 300 TOULOUSE**
Project owner	**Ville de Toulouse**
Time period	**De juillet 2023 à septembre 2025**
Type	**Déconstruction + Reconstruction**
Technical contact PO	**Walter Corrocher**
Technical contact Synethic	**Olivier Françoise**
Management team	**C+2B Architecture**

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CIRCULAR ECONOMY SUMMARY
Project Ambitions

Strategic Objectives

- **85% material recycling rate for resources and waste, i.e., +15 percentage points above the regulatory requirement, for deconstruction and extension.**

- **5% of the materials used for the extension/renovation works will come from reused or recycled materials.**

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CIRCULAR ECONOMY SUMMARY

Key Elements of the Project

An Exemplary Construction Site :

- **Reuse of exterior joinery integrated into the timber-frame walls.**
- **Reuse of wooden flooring to create new furniture (reception desk, benches, shelves).**
  Project optimization through lime-treated soils, avoiding the need for additional resources.
- **Transformation of on-site temporary works into outdoor furniture.**
- **Use of dormant stock materials for tiles and cladding.**
- **Support for local circular-economy practices and trades**

Note: a reuse-specific assignment was carried out by the technical inspector

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Contract Establishment

A reuse typology in three categories defined by Synéthic:

Non-sensitive in-situ reuse
This applies to materials already present on site whose removal and on-site storage are carried out by the deconstruction contractor. The company holding the lot concerned by the material then reinstalls it after on-site reconditioning.

Sensitive in-situ reuse
The company holding the lot concerned by a material classified as sensitive must carry out a careful removal, transport it off-site for reconditioning and storage, and then reinstall it.

Ex-situ reuse
The company holding the lot concerned sources the material through existing reuse channels. It is responsible for transport and reconditioning prior to installation.

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CIRCULAR ECONOMY REPORT

déconstruction + construction waste

Total weight of deconstructed resources:

672,6 t

Total weight of construction waste:

114,7 t

Total weight :

787,3 t

16,1 t
reuse

744,8 t
recycled material

26,4 t
non recovered material

96.6% waste recycling (Target: 85%)

205 tonnes recycled beyond the 70% regulatory requirement

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CIRCULAR ECONOMY REPORT

reused resources

65,5 t
reuse

+

55,1 t
of new resources avoided through design

4,3 t **11,8 t** **49,4 t**

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CIRCULAR ECONOMIE REPORT
deconstruction – ex-situ reused resources

EX situ




4,3 t

interior door – wood, washbasin, metal cable trays, wood-fibre suspended ceilings, traditional parquet flooring, urinal, timber beam
→ **recovered by local organisations**

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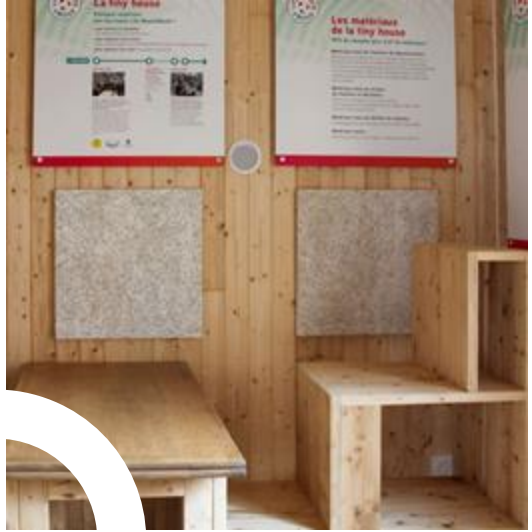
CIRCULAR ECONOMIE REPORT

deconstruction – ex-situ reused resources

EX SITU LOOP : 80 m²



Reuse on the demonstration Tiny House of the LifeWaste2Build project

© crédit photo : Envirobat Occitanie

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CIRCULAR ECONOMIE REPORT

deconstruction – ex-situ reused resources

EX SITU LOOP: 20 m2

Design and fabrication of an individual mezzanine project

© crédit photo : 3.14 Conception

CONCEPTION

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CIRCULAR ECONOMY REPORT
In-situ Reused Resources

IN situ




11,8 t

terracotta coping, concrete benches, bicycle racks, urinal, aluminum exterior joinery, display cabinet, cast-iron radiator, washbasin, gate

upcycling: reception desk, wooden bench, wall-mounted shelf

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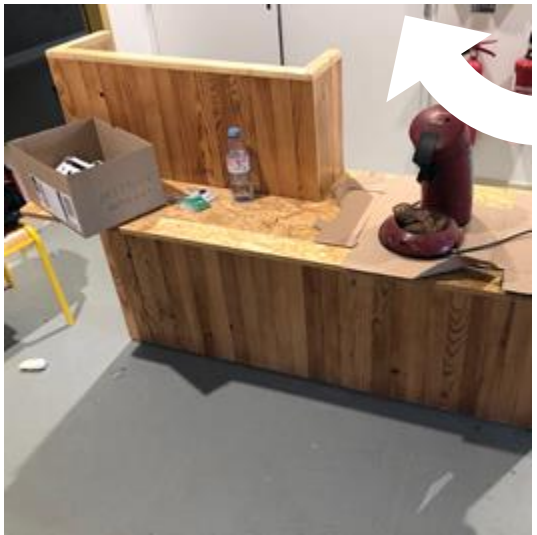
CIRCULAR ECONOMY REPORT
In-situ Reused Resources

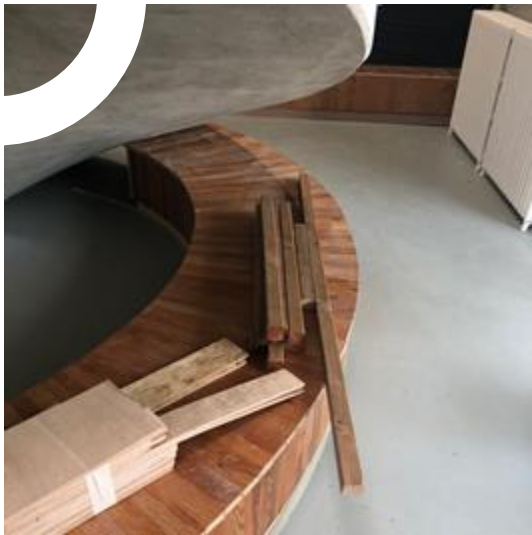
IN SITU LOOP : 150 kg

Fabrication of the reception desk, shelves and wooden benches from the original parquet flooring, carried out by the company Antras

ANTRAS MENUISERIE

Integration of this service into the Interior Joinery – Furniture contract (Lot)





SYNETHIC LE SENS ETHIQUE

LIFE WASTE 2 BUILD

LE PROJET LIFE WASTE2BUILD A ÉTÉ FINANCÉ PAR LE PROGRAMME LIFE DE L'UNION EUROPÉENNE

CIRCULAR ECONOMY REPORT
In-situ Reused Resources

IN SITU LOOP : 2m3

Transformation of temporary on-site works into a bench for the schoolyard

CRESPY GROUPE

Main Structural Works Contractor – Initiative taken during the construction phase

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CIRCULAR ECONOMY REPORT
Reuse of Joinery

IN SITU LOOP : 44 u





Company holding the lot and responsible for careful removal, reconditioning and reinstallation

SMAP


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Life
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CIRCULAR ECONOMY REPORT
In-situ Reused Resources: Exterior Joinery

IN situ

A risk-limiting approach:

- **The typology of joinery selected for reuse:**
- The reused frames are fixed. This reduces risks, as both past and future usage conditions are known (they have not undergone, and will not undergo, repeated opening and closing).
- **Specifications imposed by the project owner in the tender documents:**
- The contractor for the “Aluminum Exterior Joinery” lot was required to handle the careful removal and reinstallation of the exterior joinery intended for reuse.
- **Reduced performance requirements:**
- Current thermal regulations would have excluded the reuse of these windows in areas requiring thermal insulation (such as classrooms). For this project, the project owner specified that the reuse areas would concern circulation walkways (coursives). These passageway areas are not subject to thermal regulation requirements. The joinery only serves to provide natural lighting for the walkway.
- The contractor recovered a few additional units to anticipate construction contingencies.
- The market share related to reuse remains limited in scope.
- For SMAP, it represents 8% of the total amount allocated to Lot 5 (45 frames were reused).
- The remainder of the lot concerns the supply and installation of new joinery.

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CIRCULAR ECONOMY REPORT
In-situ Reused Resources: Exterior Joinery

IN situ

Insurance-related best practices

The reuse of exterior joinery is uncommon and rarely feasible due to evolving thermal regulations and the technological advances seen in new products. In the case of the Bénézet project, several elements support the applicability of the ten-year warranty (garantie décennale):

A controlled reconditioning process:

The aluminum and metal joinery contractor is qualified and experienced. This enables full control of the entire process, from removal to reinstallation. This level of control allows the contractor to assume the risk and provide a ten-year warranty on the reused windows.

A technical specification (CCTP) aligned with the reuse objectives:

The project owner considered that, in order to control risks, the contract for careful removal should be awarded to the same company responsible for reconditioning and reinstallation.

A ten-year warranty linked to the intended use:

The contractor acted as the entity qualifying the suitability of the reused joinery and assumes the ten-year liability solely because the usage conditions of the reused aluminum exterior joinery make it possible. The frames were, and will remain, fixed, and no thermal-performance requirement applies.

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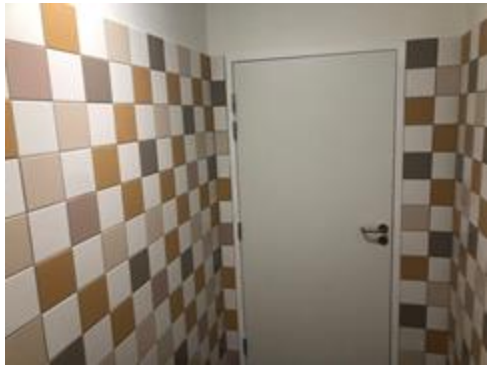
CIRCULAR ECONOMY REPORT
Reuse Sourcing / Surplus Stock

appro. extérieur



mixing and selection of tiles carried out with the contractor and the TECHNI CERAM

ANTRAS MENUISERIE

cladding sourced from downgraded batches or surplus stock

49,4 t

carpet, cable tray, timber cladding, steel decking, wall and floor tiles

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CIRCULAR ECONOMY REPORT
Environmental Component

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Environmental Component				
Material Recovery and Recycling	**Reuse**	**reuse loop**	**resource savings**	**carbon savings from reuse**
204,96 t of waste recovered beyond legal requirements	**65,4 t** of reused resources: saved from disposal and avoided production	**26** completed loop	**55 t** uses of gravel avoided	**49,8 CO2 eq** avoided through reuse
96,57% material recovery rate for construction waste, instead of the 70% required by law	equivalent to the annual household waste production of **142** residents	terracotta coping, concrete bench, bicycle racks, urinal, aluminum exterior joinery, reception desk, wooden bench, display cabinet, wall-mounted shelf, cast-iron radiator, gates, washbasin, carpet, metal cable trays, timber cladding, steel decking, tiles, sink basin, interior door, mineral suspended ceilings, traditional parquet flooring, urinal, timber beam	**equivalent to 500m3** or the equivalent of a 25×10 m swimming pool	**equivalent to 24** people flying from paris to NY

CIRCULAR ECONOMY REPORT
Employment Component

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	Engineering	careful removal	reconditioning	TOTAL (h)
STTL Déconstruction		350		350
LOT 02 GO - Crespy			40	40
LOT 03 bardage - Antras	10			10
LOT 4 etanchéité - Sobra	5			5
LOT 5 MEX - SMAP		136	8	144
LOT 9 MIN - Antras			50	50
LOT 11 sols durs - Techni Ceram	40			40
LOT 13 CFO/CFA - Allez 1 Cie	5			5
LOT 15 CVC - MGC	8			8
TOTAL (h)	68	486	98	652

TOTAL DAYS	**93**	oh additional work created
	0,406	FTE year created
Estimated economic impact : €35/h	**22 820 €**	**excl. tax in economic gains linked to job creation**

EMPLOYMENT COMPONENT
JOB CREATION
93 person-days of jobs created
0.4 FTE-year created (1607 h/FTE)

BILAN ÉCONOMIE CIRCULAIRE

Volet financier / GLOBAL

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Economic Component				
Direct economic impacts		**Overall Assessment**	**Objectives**	**Economic externalities**
93 387 € reinvested in circular-economy practices and trades (careful removal, reconditioning, second-hand purchasing)	**2 337 €** savings linked to waste avoided through reuse	**0,80 %** savings for the Project Owner	**Target Objective :** **5%** of the total (excl. tax) value of the products, equipment and materials implemented on the project dedicated to purchasing reused products, equipment and materials. i.e. **€143,012**	**22 820 €** in economic gains linked to job creation
45 087 € in savings on new purchases avoided through reuse sourcing or resource-saving strategies	**45 919 €** **in total savings for the Project Owner**	sur **5 720 500 €** of the total works contract value	**Target : 125 705 €** of the target set, **88%** of the total supply value **4,4%** c'est à dire du montant total de fourniture	**3 473 €** in economic gains linked to CO_2-emission savings

RETOURS D'EXPÉRIENCES

SUCCESS CONDITIONS / IMPACTS

Strong stakeholder involvement:
Project Owner / Design Team with a circular-economy mission and dedicated time;
technical inspector with a specific reuse-assessment mission.

Controlled process:
integration from the earliest design phase (competition / APS) + adaptability during the operational phase;
PEMD diagnostic supplemented by a resource diagnostic by stabilized employment domain;
dedicated working sessions to validate loops and prescribing strategies (sensitive reuse, allotment);
use of a single shared tool (reuse report).

Numerous complex loops successfully completed:
including the in-situ reuse of 44 exterior joinery units through a cascading qualification process.

Positive impacts: nearly 5% reuse, with economic gains as a result!

LIMITATIONS AND CONSTRAINTS

Challenging synchronisation of timelines:
limited temporary storage space;
an unsuccessful lot leading to changes in the removal strategy to optimise scheduling;
difficulty projecting which resources should be preserved for 12 to 24 months before their actual integration into the works.

Uneven understanding and adoption of the objectives:
while many trades embraced the approach, some lots were unable to contribute to the circular-economy dynamic.

A flagship operation of the LIFE WASTE2BUILD project, confirming the achievement of ambitious objectives while generating economic gains!

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