Environmental product declaration

Resene Aquaclear

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What is an environmental product declaration?

An Environmental Product Declaration (EPD) tells the environmental story of a product over its life cycle in a format that is clear and transparent. It is science-based, independently verified and publicly available. EPDs are often compared to the nutrition labels on food products.

EPDs help manufacturers translate complex sustainability information about their product's environmental footprint into simpler information that governments, companies, industry associations and end consumers can trust to make decisions.

An EPD communicates the environmental impacts at different stages in a product's life cycle. This may include the carbon emitted when it's made, and any emissions that pollute the air, land or waterways during its use.

Resene Aquaclear

This EPD covers the environmental impacts of Resene Aquaclear when used on a building subject to treatment level. The product is manufactured at Resene's New Zealand facility in Naenae, Wellington.

This EPD has a cradle-to-gate scope with options, Modules C1–C4 and Module D (A1 – A3, A4 + A5 + C + D).* It includes the environmental impacts associated with:

» Extracting, processing and transporting raw materials
» Manufacturing, distributing and applying the product
» Demolishing, end-of-life transport, waste processing and waste disposal of the painted wall†
» Reuse, recovery, and recycling potential (D).

* 'Cradle' refers to the raw material extraction and 'gate' is the gate of the manufacturing facilities as the product is ready to go out to customers.

† Impacts and indicators related to waste are considered in the module in which the waste occurs in line with the polluter pays principle specified in EN 15804.

Contents

Welcome to Resene

Resene are your coatings, paints, stains, clears and colour experts.

Resene began in 1946 when our founder Ted Nightingale needed to paint his concrete buildings. There were no suitable paints at the time, so he developed his own paint in a cement mixer in his garage.

In 1951, Ted launched New Zealand's first water-based paint under the brand name 'Resene' – a name that comes from resin, the main ingredient in paint. Ted's demonstrations of water-based paints impressed customers because the paint lasted and was easy to clean up. Since we introduced our water-based paint, we have earned a reputation for manufacturing quality products that meet our customers' demanding standards.

We're based in Lower Hutt and sell our products in New Zealand, Australia and the Pacific. Our team of over 700 staff continues to develop quality paint products and share these with our customers.

Driven by innovation

We have an international reputation as a leader in paint research and technology. In response to clients' needs, our technical team have developed many new products. From cladding to ceilings, industrial to interior, engineered to exterior, artisan to architectural, we have a coatings solution to suit our clients' projects.

Our paint services and support

Providing durable paint and coatings

Paint and coatings protect and enhance the surfaces our customers care about. Our durable paint protects surfaces for longer. We create paint systems that work with the surface and the environment that surface is located in, meaning things get done right first time and with less waste.

Sharing expert advice

Our Resene ColorShop teams have expert knowledge of our products and colour range and help customers choose the best products for their projects. We have a network of Resene ColorShops in New Zealand and Australia with staff who can provide expert advice on coatings, colours, prep and application. The same expert advice is available online through our Ask a Paint Expert online service and our Resene TechSpec specification service.

Lower impact decorating

Resene Eco.Decorators are our network of painters working to reduce the impacts of decorating. Resene Eco.Decorators use our Eco Choice-approved paint, reduce paint waste and are skilled painters. They also use less water with our Resene WashWise system. Each Resene Eco.Decorator is audited to ensure they use sustainable work, waste and work sign-off systems.

Trusted by consumers in New Zealand

Since 2014 we have proudly been part of the Consumer Trusted programme which recognises exceptional customer service. Our Resene ColorShops have also won the Reader's Digest Quality Service Award for paint and decorating stores every year since the Awards began in 2017. Our focus on quality has been recognised as we've won the Most Trusted Paint Brand each year since 2012.

Our environmental sustainability work

These are some ways we are reducing our impact on the environment.

We are Eco Choice-certified

Our Eco Choice-approved products and programmes like Resene Eco.Decorator, Resene PaintWise and Resene WashWise help our customers make better environmental choices.

We limit Volatile Organic Compounds (VOCs)

Our range includes coatings without added VOCs. VOCs pollute the air and negatively affect human health. Our wide range of Eco Choice-approved products is waterborne, low-odour and has low or no added VOCs. These waterborne finishes make tools easier to reuse, sites easier to clean and professional-quality paint available to everyone.

Our decorative paint range is less than 6% solventborne and we've reduced our average VOC levels in these paints by over 90% since 1980.

We use renewable ingredients in our paints

Our chemists are developing paint ingredients that use renewable content like linseed oil and meet Eco Choice standards. We're using more renewable materials that are plant-based, including paint thickeners and solvents that have no added VOCs. Plant-based materials also help disperse pigments in our paint. Find out more about our plant-based paints here.

We source our raw materials carefully and minimise our waste

Resene has been assessed and certified as meeting the requirements of ISO 9001:2015 and ISO 14001:2015 certification. We work hard to make quality products, use our resources efficiently and minimise waste. That's why we check the sources of our raw materials and pay more for ingredients that have lower environmental impacts. We donate products to community organisations for reuse, including Resene testpots returned by customers as part of our testpots recycling programme, to maximise the use of all paint we make.

Learn more about Resene Eco.Choice-approved products

Eco Choice Aotearoa

We're reducing our carbon emissions

TOITŪ CARBON REDUCE ISO 14064-1 ORGANISATION

We are proud to be Toitū carbonreduce-certified, meaning we measure our emissions to ISO 14064-1:2018 and Toitū requirements. We continue to look for ways to reduce our carbon emissions.

We are part of the CarbonClick programme through our Resene ColorShop Online. CarbonClick supports certified projects that offset carbon emissions. Find out more here.

We've won sustainability awards

We are proud to have won awards for our sustainability work since 2010:

- Sustainable Business Network Trailblazer Award
- Green Ribbon Award
- 60 Sustainable awards – Winner Exemplar and Marketplace categories
- Sustainable Business of the Year

We recycle our paint and packaging

Our Resene PaintWise recycling service takes care of unwanted paint and packaging at the end of a project. Since 2004, this service has recycled over six million packs, one million litres of paint and tonnes of packaging.

Our PaintCrete product adds unwanted paint to concrete to replace virgin materials. We recycle plastic packaging into new 100%-recycled Resene paint pails, metal cans into other metal products and run a solvent recycling programme for solventborne paints. In Australia, we are part of the Paintback recycling service.

Working with our community and industry

Planting trees

We work with Trees that Count to plant native trees that regenerate local habitats. Together, we've planted over 30,000 trees that will remove an estimated 7,000+ tonnes of carbon dioxide from the atmosphere over 50 years.

Keeping New Zealand beautiful

Since 2003 we have supported the Keep New Zealand Beautiful and Paint New Zealand Beautiful programmes that encourage community pride. We donate waterborne paint to community groups and councils to cover graffiti and beautify communities. Learn more about our initiatives here.

Supporting our industry partners

Our business supports industry organisations to train their members through continuous professional development. We work with organisations like the New Zealand Institute of Architects, Architectural Designers New Zealand and Master Painters to deliver training that improves both our industries.

We are also a proud Gold Foundation member of the New Zealand Green Building Council.

Where we manufacture our paints

Waterborne paints are manufactured at Resene's New Zealand facility in Naenae, Wellington. Solventborne paints are made at a separate facility in Upper Hutt, Wellington, New Zealand. Resene Pacific also manufactures for its local market in Fiji.

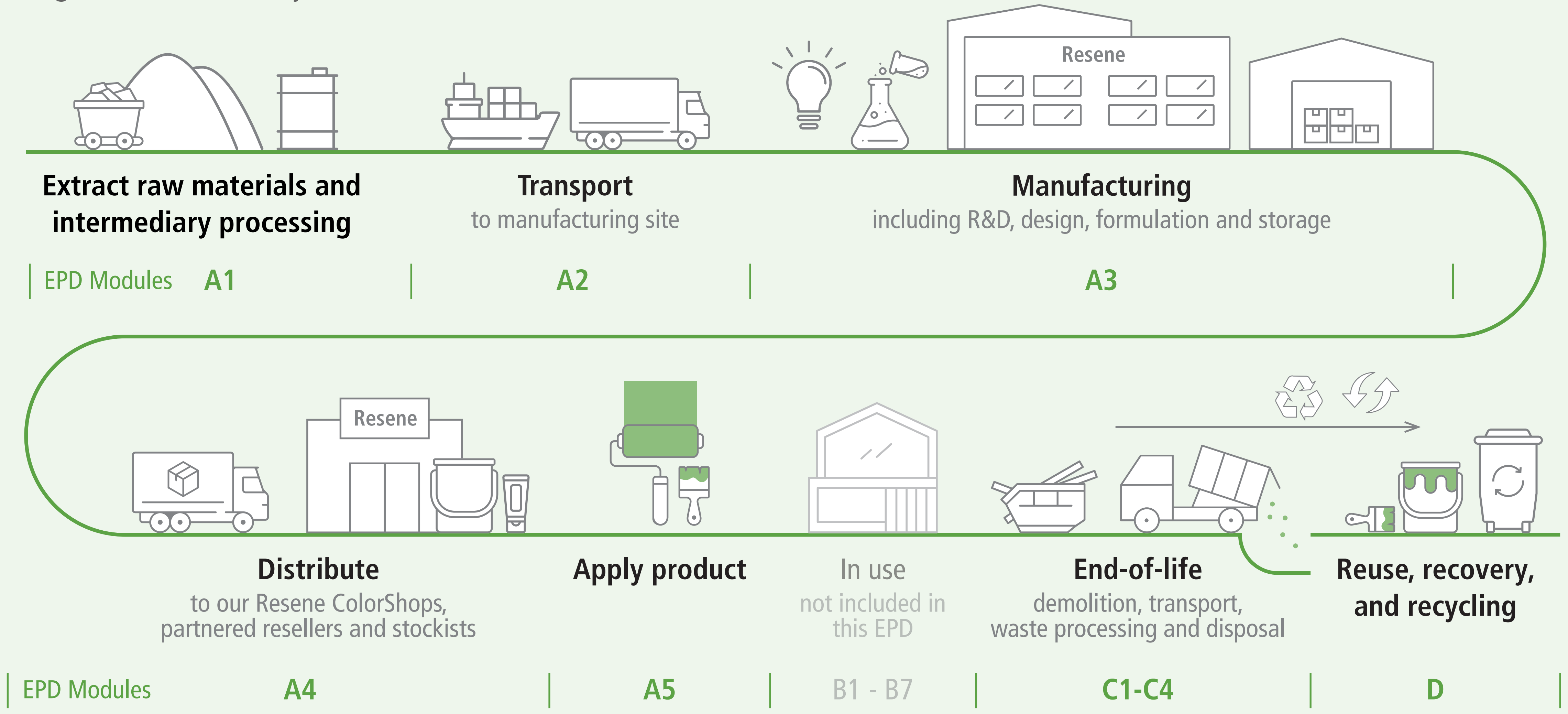
We carefully source our resin, additives, solvent and pigments, and process these in our factories. We listen to our customers and work with industry to develop new products. We ship our paint and coatings to our Resene ColorShops and resellers. Once a project is complete, we collect leftover paint and materials through our Resene PaintWise recycling service.

Wellington, New Zealand

Resene manufacturing facility in Naenae, Wellington

Product life cycle

Figure 1. Product life cycle and EPD modules



Product covered in this EPD:
Resene Aquaclear

clear waterborne urethane varnish – interior – Eco Choice approved

Resene Aquaclear is a clear waterborne urethane designed to protect and enhance interior timber surfaces with a non-yellowing finish.

It's available in a range of sheen levels as a low VOC and low odour alternative to solventborne urethanes. To rejuvenate or enhance the timber colour, use Resene Colorwood natural wood stain first or mix Resene Aquaclear with Resene Colour Enhance.

Typical uses:
Cork, desks, doors, fibre and particle board, furniture, panelling, parquet, skirtings, solid timber and veneers.

About this EPD

Considered in this EPD

This EPD has a cradle to gate scope with options, Modules C1–C4 and Module D (A1–A3, A4 + A5 + C + D). It includes the environmental impacts associated with:

» Extracting, processing (A1) and transporting (A2) raw materials
» Manufacturing (A3), distributing (A4) and applying the product (A5)
» Demolishing (C1), end-of-life transport (C2), waste processing (C3) and waste disposal (C4) of the painted wall*
» Reuse, recovery, and recycling potential (D).

The use stage (B1 – B7) is not included in this EPD as it varies by building type and consumer needs. The paint reaches end-of-life with the surface it is applied to. Machinery (e.g. excavator) demolishes the surface.

As surfaces and the paint that covers them are generally not recycled, waste processing for reuse and recycling (C3) is not relevant. After painting however, unused paint and pails can be recycled and this is included in A5 and D where relevant.

* Impacts and indicators related to waste are considered in the module in which the waste occurs in line with the polluter pays principle specified in EN 15804.

How to use this EPD

Resene has developed this product specific EPD to help showcase the environmental credentials of their paint and coating products. The EPD also provides life cycle data for calculating the impacts of the product over time. These datasets may be used by specifiers and developers to calculate and present the environmental impacts of particular construction projects.

This EPD can allow the represented products to qualify for points under the Green Star rating system of the New Zealand Green Building Council (NZGBC) and Green Building Council Australia (GBCA).

The technical information section of the EPD provides details for the method, assumptions and description of environmental indicators. This is followed by the results from modelling the life cycle assessment of the product.

Technical information

Declared unit

The declared unit is:
the paint and packaging required to apply 1 coat to 1 m^2 of a surface based on the product's specified spread rate.

Product specifications related to application per coat are provided in Table 1.

Table 1: Resene paint product specifications

Product	Density (kg/L)	Spread rate (m^2/L)	Efficiency (L/m^2)*	Efficiency (kg/m^2)†	VOC (g/L)	Solid content (%)	Packaging material	Pail size (L)
Resene Aquaclear	1.03	12	0.083	0.086	95	27.6	Tin / Steel	4

* Efficiency (L) = 1/Spread rate [m^2/L]
† Efficiency (kg) = Efficiency L × kg/L where Efficiency is the amount of paint on 1 m^2 of wall in terms of paint volume and solid mass

Declared unit (kg/m^3) = Density (kg/L) x Efficiency (L/m^2)

The paint can be packaged in one of three materials (tin plated steel, high-density polyethylene (HDPE) or polypropylene) and in a range of sizes. In line with the PCR (EPD International, 2024), the results in the EPD are presented for the most common size of pail/can in which the paint can be sold in (i.e. not a weighted average). Table 2 presents the packaging and pail size for the paint.

Table 2: Packaging type for each product

Unit	Material	Pail size (L)	Pail mass (kg)	Mass of packaging per declared unit (kg)
Resene Aquaclear	Tin / Steel	4	0.38	0.092

Classification

Table 3 shows the relevant UN CPC and ANZSIC codes applicable to Resene Aquaclear.

Table 3: UN CPC and ANZSIC codes applicable to Resene Aquaclear

Product	Classification	Code	Category
Resene Aquaclear	UN CPC Ver.2	35110	Paints and varnishes and related products
	ANZSIC 2006	C191600	Paint and Coatings Manufacturing

Product composition

Table 4 presents the content declaration; due to the proprietary nature of paint formulations, a range per material is presented in the EPD. Post-consumer recycled material for all product ingredients and packaging is declared as 0. Up to three ingredients contain biogenic content, however, the percent of biogenic content in the product is less than 5%, hence not declared. There is no biogenic material in the packaging.

Resene paint products do not knowingly contain materials identified in the European Chemicals Agency's Candidate List of Substances of Very High Concern (contaminants may be present below 0.1%, ECHA 2022).

Table 4: Paint composition for Resene Aquaclear

Materials	% composition	Post-consumer recycled material weight-% of product	Biogenic material weight-% of product	Biogenic material kg C/ DU‡
Polymer Dispersion 50%	50 - 72	0	0	0
Water	5 - 15	0	0	0
Anti-Scratch Agent	0 - 2	0	0	0
Thickening Agent	0 - 2	0	0	0
Film Forming Agent	2 - 9	0	0	0
Dispersing Agent	0 - 0.5	0	0	0
Anti-foaming Agent	0 - 2	0	0	0
Preservatives	0 - 0.5	0	0	0
pH Modifier	0 - 0.5	0	0	0
VOC	3 - 5	0	0	0

Table 5: Packaging content declaration for Resene Aquaclear

Unit	Material	Mass of packaging per declared unit kg	Weight-% versus the product	Biogenic material, weight-% versus the product	Weight biogenic carbon kg C/ DU‡
Resene Aquaclear	Tin / Steel	0.092	9%	0.0	0.0

‡ DU = Declared unit

System boundaries

The EPD is of type (b): cradle to gate with options, Modules C1–C4, and Module D (A1–A3 + A4 + A5 + C1-C4 + D). It includes the environmental impacts associated with:

- Extracting, processing (A1) and transporting (A2) raw materials
- Manufacturing (A3), distributing (A4) and applying the product (A5)
- Demolishing (C1), end-of-life transport (C2), waste processing (C3) and waste disposal (C4) of the painted wall
- Reuse, recovery, and recycling potential (D).

The use stage (B1 – B7) is not included in this EPD as is it considered variable by building type and consumer preference. The paint reaches end-of-life with the surface it is applied to, typically plasterboard wall. This surface is demolished using machinery (e.g. excavator).

Since the surface and therefore the paint is generally not recycled, waste processing for reuse and recycling (C3) is not relevant. However, waste produced during the application stage in terms of remaining paint in paint cans and the cans themselves undergo processing and are included under Modules A5 and D where applicable.

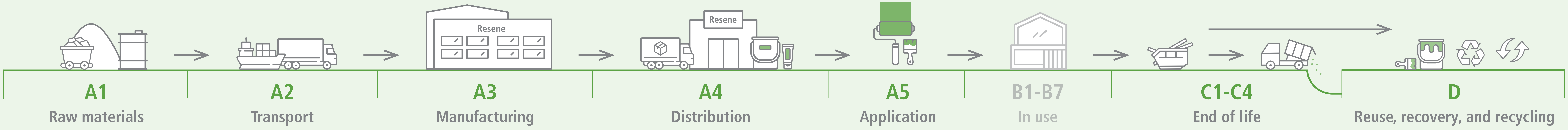
Module A1 has the geography stated as 'Global' (GLO) due to the global nature of the Resene raw material supply chain.

Table 6: Modules included in the scope of the EPD (X = declared module | ND = module not declared)

	Product stage			Construction process stage		Use stage							End-of-life				Recovery
	Raw material supply	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	NZ	NZ	NZ	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	GLO
Specific data		15%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products		0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites*		0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-

* includes only impacts related to the manufacturing processes (primarily electricity and water use) and raw materials transport.

Figure 2. Product life cycle and EPD modules



A1) Raw material supply

- Extraction and processing of raw materials.
- Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport. This includes energy needed for raw material supply and energy for manufacturing in core process.
- Production of tin-plated steel (tinplate) and HDPE pails for packaging.

A2) Transport

- External transport of the raw material and packaging to the manufacturing sites.
- Internal transport between process steps.

A3) Manufacturing

- Weighing of ingredients, mixing and packaging.
- Treatment of waste generated from the manufacturing processes up to the end-of-waste state.
  - For all solid and liquid waste that is disposed of, transport and municipal landfill is included.
  - For all waste sent for recycling, transport to the recycler is included, but not any of the recycling operations beyond this.
  - No credits are awarded for scrap leaving the system boundary in module A; all benefits and loads are cut off after the transport step.

A4) Distribution to customer

- Truck transport to retailer / wholesaler.

A5) Application, assuming roller application

- Paint application using a roller (typical for commercial painting).
- Water for washing roller and tray.
- Wastewater treatment for water and paint residue.
- Emissions of water vapour and VOCs to air during paint drying. It is assumed that all volatile components evaporate in module A5.
- Waste treatment for packaging, including transport to end-of-life. Landfill is included within the system boundary. Recycled steel packaging is assumed to reach its end-of-waste state after transport to the recycler. Due to its low value, HDPE packaging which is sent to recycling is assumed to reach its end-of-waste state after it has been recycled into recycled HDPE (after grinding, washing, granulation and pelletising). Unusable / unrecoverable paint left in the pail is assumed to be landfilled in most cases.
- Production of roller and tray are not included, as it is assumed that these are reused many times before their eventual disposal. Their impacts would therefore be negligible.

C1) Deconstruction, demolition

- Deconstruction of the building materials the paint is applied to. The mass of the dry paint is used to calculate the proportion of environmental impacts associated with the deconstruction/demolition of the building, following an attributional approach.

C2) Transport to end-of-life processing

- Transport of dry paint residue to landfill.

C3) Waste processing

- As all paint waste (paint that cannot be recovered at PaintWise) goes straight to landfill at end-of-life, there is no processing involved. Therefore, waste processing impacts have been modelled as zero for this EPD.

C4) Disposal

- Landfill of dry paint residue. While the paint will almost certainly still be attached to the surface onto which it was applied, the environmental burdens associated with this surface are excluded and should instead be counted within the system boundary for that product in line with the attributional approach applied in this study.

D) Benefits and loads beyond the system boundary (next product life cycle) – Recycling potential

- Benefits and loads from the avoided production of steel or HDPE (depending on the product's packaging type) from the fraction of packaging sent for recycling from module A5. Only net scrap is sent to module D. More specifically, scrap generated in module A5 is first looped back to satisfy any open scrap inputs in modules A1 – A3 and only the remainder is sent to module D.

Life cycle inventory (LCI) and assumptions

Primary data were used for all paint manufacturing operations up to the factory gate. Primary data for paint manufacturing operations was sourced from the period 1 September 2020 to 31 August 2021. Background data was used for input materials sourced from raw material and packaging suppliers.

Upstream data

With the exception of energy and water use (which correctly reflect New Zealand conditions) upstream (supply chain) data used were European/US due to a lack of consistent LCI data for New Zealand at the time this study was conducted.

LCA software and database

All data in the background system (energy inputs, transport processes, packaging and raw materials) are from Sphera's Managed LCA Content (MLC) Database 2023.2 (Sphera, 2024). The reference year for the data ranges from 2016 – 2023 and therefore all datasets are within the 10-year limit allowable for generic data under EN 15804 and the PCR.

Electricity

The composition of the residual electricity grid mix of New Zealand is modelled in LCA FE based on published data for the year 1 April 2021 – 31 March 2022 (BraveTrace, 2023). The New Zealand residual electricity mix is made up of hydro (56.6%), geothermal (19.7%), natural gas (12.5%), wind (6.55%), coal (4.25%), biomass (0.266%) and biogas (0.16%).

Onsite consumption (3%) and the medium voltage (1 kV – 60 kV) grid's transmission and distribution losses (3.17%) are calculated based on data from the Ministry of Business, Innovation & Employment (MBIE, 2023).

The emission factor for the New Zealand residual grid mix (1 kV – 60 kV) for the GWP-GHG indicator is 0.146 kg CO_2e/kWh (based on EF3.1). The relatively small difference between the residual grid mix and the consumption mix for New Zealand electricity means the choice of electricity modelling approach does not impact the comparability of EPDs.

Recycling and recycled inputs

Paint packaging, steel and HDPE plastic, are sent for recycling from the installation (A5). Paint does not use any recycled input materials. HDPE plastic pails are manufactured from 100% primary inputs. In practice, steel is looped to fulfil any recycled steel input required and net scrap is sent to module D. All recycled HDPE scrap is sent to module D.

Raw materials transport

Raw material transport has been calculated or estimated for each material based on weighted average for sea and truck transport from multiple suppliers.

Table 7: Paint distribution (Module A4)

Means of transport	Estimated weighted avg. transport to construction sites (km)	Utilisation rate (%)	Comments
Road: Euro 4 truck (20 to 26 t gross weight / 17.3 t payload capacity)	450	55	The distance is based on sales weighted average distance. The total distance travelled (as a weighted average) is 430 km by road and 22 km by sea. The EPD assumes an additional 20 km by truck from the distribution centre (i.e., Resene ColorShops, Mitre 10) to the install location.
Sea: Container ship (5.000 to 200.000 dwt payload capacity, deep sea)	22	48	

Life cycle inventory (LCI) and assumptions (continued)

Paint application waste (Module A5)

Paint waste (70%) from construction site was assumed to be sent back to Resene though PaintWise scheme (assumed 20 km travelled by truck to return unused paint and packaging) to Resene. The remaining 30% is assumed to go to landfill (50 km distance assumed).

Table 8: Assumptions for paint application waste

Process	Unit per kg of paint
Collection process	0.7 kg collected separately 0.3 kg collected with mixed construction waste
Recovery system	0 kg for re-use
	0.7 kg for recycling
	0 kg for energy recovery
Disposal specified by type	0.3 kg product or material for final deposition
Assumptions for scenario development	» 70% of paint (including packaging) is sent back to Resene via a diesel driven, Euro 4 truck (28 – 34 t gross weight / 22 t payload capacity). Transport distance is assumed to be 20 km with a capacity utilisation of 50%. » Remaining paint (30%, including packaging) is transported from the construction site to a landfill facility via a diesel driven, Euro 4 truck (28 – 34 t gross weight / 22 t payload capacity). Transport distance is assumed to be 50 km with a capacity utilisation of 50%.

Paint end-of-life (Module C1 – C4)

All paint waste goes straight to landfill at end-of-life, there is no processing involved. Therefore, waste processing impacts have been modelled as zero for this EPD.

Table 9: Assumptions for end-of-life scenario development

Process	Unit per kg of paint
Collection process	0.0 kg collected separately 1.0 kg collected with mixed construction waste
Recovery system	0 kg for re-use
	0 kg for recycling
	0 kg for energy recovery
Disposal specified by type	1.0 kg product or material for final deposition
Assumptions for scenario development	» Diesel consumption for demolishing/ deconstructing the building with an Excavator (100 kW): 0.172 g diesel per kg of product. » All construction waste is transported from the building site to a landfill facility via a diesel driven, Euro 4 truck (28 – 34 t gross weight / 22 t payload capacity). » Transport distance is assumed to be 50 km with a capacity utilisation of 50%. » No waste processing involved; hence Module C3 impacts are zero.

Cut-off criteria

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary as per the PCR (EPD International, 2024).

thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the foreground production process (‘capital goods’), regardless of potential significance.

High-quality infrastructure-related data isn’t always available and there is no clear cut-off for what to include. For this reason, capital goods data are applied to LCA studies inconsistently. This is expected to lead to reduced consistency and comparability of EPDs. Capital goods were previously excluded from EPDs, thus including capital goods in current EPDs would further reduce their comparability. Infrastructure used in electricity generation is included as standard in the Sphera MLC datasets, as this is important for renewable generation.

All other reported data was incorporated and modelled using the best available life cycle inventory data, in compliance with EN15804 (section 6.3.6) (CEN, 2019) and PCR (EPD International, 2024).

Allocation

Product level data was available via bill of materials (BoM). Site level data such as electricity, water input and output, raw material packaging were allocated to products based on production volume (litres output) for the study period.

Where subdivision of processes was not possible, allocation rules listed in PCR section 6.4 have been applied. No secondary materials are used in the production process. Allocation for input materials that contain secondary materials occurs in the upstream datasets. End-of-life allocation generally follows the requirements of ISO 14044 (section 4.3.4.3) and generally follows the polluter pays principle (ISO, 2006a).

Assumptions

Assumptions made during the LCI collection and modelling process are as follows:

- It was assumed that secondary data from outside New Zealand is sufficiently representative of the impacts of the raw material inputs. Where the geography is expected to have an impact on the results, this is indicated as a geographical proxy.
- The study assumes Resene’s PaintWise scheme recovers some of the paint product at the application stage. It was also assumed that this process is manual requiring no energy, materials or additional outputs. Since no recovered paint ends up within the paint formulations, the recovered paint is cut-off after transport to Resene facility.
- All products have the same distribution profile – i.e. sales weighted distribution is used across product range.
- Small quantities of thinner are often included during application. These have been assumed to be negligible and therefore excluded from the study.

Environmental impact indicators

This is an introduction to the core environmental impact indicators. The best-known effect of each indicator is listed in the descriptions and the abbreviations, in brackets, correspond to the labels in the following results tables.

Table 10: Environmental impact indicators described

Indicator and description

Climate change (global warming potential) (GWP)

(GWP-f, GWP-b, GWP-luluc)

A measure of greenhouse gas emissions, such as CO_2 and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may in turn have adverse impacts on ecosystem health, human health and material welfare. The global warming potential total (GWP-t), is split into three sub indicators: fossil (GWP-f), biogenic (GWP-b) and land-use and land-use change (GWP-luluc).

Ozone depletion potential (ODP)

Depletion of the ozone leads to higher levels of UVB ultraviolet rays reaching the earth's surface with detrimental effects on humans and plants. Ozone depletion potential is a measure of air emissions that contribute to the depletion of the stratospheric ozone layer.

Acidification potential (AP)

Acidification potential is a measure of emissions that cause acidifying effects to the environment. A molecule's acidification potential indicates its capacity to increase the hydrogen ion (H+) concentration in the presence of water, thus decreasing the pH value. Potential effects include fish mortality, forest decline, and the deterioration of building materials.

Eutrophication potential (EP-fw, EP-fm, EP-tr)

Eutrophication covers all potential impacts of excessively high levels of macronutrients, the most important of which are nitrogen (N)and phosphorus (P). In aquatic ecosystems where this term is mostly applied, this typically describes a degradation in water quality. Eutrophication can result in an undesirable change in the type of species that flourish and an increase in the production of biomass. As the decomposition of biomass consumes oxygen, eutrophication may decrease the available oxygen level in the water column and threaten fish in their ability to respire.

Photochemical ozone formation potential (POFP)

Photochemical ozone formation potential gives an indication of the emissions from precursors that contribute to ground level smog formation, mainly ozone (O_3). Ground level ozone may be harmful to human health and ecosystems and may also damage crops. These emissions are produced by the reaction of volatile organic compounds (VOCs) and carbon monoxide in the presence of nitrogen oxides and UV light.

Abiotic resource depletion (ADP-mm, ADP-f)

The consumption of non-renewable resources decreases the availability of these resources and their associated functions in the future. Depletion of mineral resources and non-renewable energy resources are reported separately. Depletion of mineral resources is assessed based on total reserves.

Water use (WDP)

Water scarcity is a measure of the stress on a region due to water consumption.

Environmental impact indicators

The following tables show the results grouped in seven categories, each looking at different types of indicators. The headings provide descriptions for each of these categories.

Each column of numbers represents one declared unit:
the paint and packaging required to apply 1 coat to 1 m² of a surface based on the product's specified spread rate.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

EN15804+A2 core environmental impact indicators

The reported impact categories represent impact potentials. They are approximations of environmental impacts that could occur if the emissions would follow the underlying impact pathway and meet certain conditions in the receiving environment while doing so. The environmental impact results are therefore relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks.

Long-term emissions (>100 years) are not taken into consideration in the impact estimate.

Table 11: EN15804+A2 Core Environmental Impact Indicators

Indicator	Abbr.
Global warming potential – total	GWP-t
Global warming potential – fossil	GWP-f
Global warming potential – biogenic	GWP-b
Global warming potential – land use and land use change	GWP-luluc
Ozone depletion	ODP
Acidification potential	AP
Eutrophication potential – freshwater	EP-fw
Eutrophication potential – marine	EP-m
Eutrophication potential – terrestrial	EP-t
Photochemical ozone formation potential	POFC
Abiotic depletion potential – minerals & metals*	ADP-mm
Abiotic depletion potential – fossil fuels*	ADP-f
Water depletion potential*	WDP

* The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Resource use indicators

The resource use indicators describe the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water.

The use of primary energy is separated into energy used as raw material and energy used as energy carrier as per option C in Annex 3 in the PCR (EPD International, 2024).

Note on water consumption:
The FW indicator in the EPD results tables reports consumption (i.e. net use) of 'blue water,' including river water, lake water and ground water. This indicator deliberately excludes consumption of 'green water' (rain water), as net loss should be interpreted as any additional water loss beyond what would occur in the original, natural system.

Table 12: Life cycle inventory indicators on use of resources

Indicator	Abbr.
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE
Use of renewable primary energy resources used as raw materials	PERM
Total use of renewable primary energy resources	PERT
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE
Use of non-renewable primary energy resources used as raw materials	PENRM
Total use of non-renewable primary energy resources	PENRT
Use of secondary material	SM
Use of renewable secondary fuels	RSF
Use of non-renewable secondary fuels	NRSF
Total use of net fresh water	FW

Waste and output flow indicators

Waste indicators describe waste generated within the life cycle of the product. Waste is categorised by hazard class, end of life fate and exported energy content.

Table 13: Life cycle inventory indicators on waste categories and output flows

Indicator	Abbr.
Hazardous waste disposed	HWD
Non-hazardous waste disposed	NHWD
Radioactive waste disposed	RWD
Components for reuse	CRU
Materials for energy recovery	MER
Materials for recycling	MFR
Exported electrical energy	EEE
Exported thermal energy	EET

Biogenic carbon content indicators

Biogenic carbon refers to the carbon stored in organic materials. This is sequestered during growth and released at end of life. EN15804+A2 requires the declaration of biogenic carbon content of the product and its packaging.

Table 14: Biogenic Carbon Indicators

Indicator	Abbr.
Biogenic carbon content – product	BCC-prod
Biogenic carbon content – packaging	BCC-pack

Additional environmental impact indicators

These indicators are voluntarily included to facilitate modularity where an EPD is used as input data for creating another EPD downstream in the value chain (EPD International, 2024).

Table 15: Additional environmental impact indicators

Indicator	Abbr.
GWP-GHG†	GWP-GHG
GWP-GHG (IPCC AR5)‡	GWP-GHG (IPCC AR5)
Respiratory inorganics	PM
Ionising radiation – human health§	IRP
Eco-toxicity – freshwater¶	ETP-fw
Human toxicity – cancer¶	HTP-c
Human toxicity – non-cancer¶	HTP-nc
Land use related impacts / soil quality¶	SQP

† This indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero. It has been included in the EPD following the PCR.

‡ GWP-GHG (IPCC AR5) is an additional GWP100 indicator that is aligned with the Intergovernmental Panel on Climate Change (IPCC) 2013 Fifth Assessment Report (AR5) (IPCC, 2013), national greenhouse gas reporting frameworks in Australia and New Zealand and previous versions of the Construction Products PCR (PCR2019:14v1.11). It excludes biogenic carbon and indirect radiative forcing.

§ This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator

¶ The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

EN15804+A1 environmental impact indicators

EN 15804+A1 core environmental impact categories aid with historical comparison and are used within various rating tools.

Results using the EN15804+A1 indicators and characterisation factors are included to aid comparison and backwards compatibility with rating tools. While the indicators and characterisation methods are from EN 15804:2012+A1:2013, other LCA rules for the study (system boundaries, allocation, etc.) are according to EN 15804:2012 +A2:2019; i.e. this study does not claim that the results of the A1 indicators are compliant with EN 15804:2012+A1:2013.

Table 16: EN15804+A1 Environmental impact indicators

Indicator	Abbr.
Global warming potential – total	GWP (EN15804+A1)
Depletion potential of the stratospheric ozone layer	ODP (EN15804+A1)
Acidification potential of land and water	AP (EN15804+A1)
Eutrophication potential	EP (EN15804+A1)
Photochemical ozone creation potential	POCP (EN15804+A1)
Abiotic depletion potential – elements	ADP-e (EN15804+A1)
Abiotic depletion potential – fossil fuels	ADP-f (EN15804+A1)

Results for Resene Aquaclear

(the paint and packaging required to apply 1 coat to 1 m² of a surface based on the product's specified spread rate.)

EN15804+A2 core environmental impact indicators

Table 17: Environmental impact (EN15804+A2) covering modules A1 – 5, C1 – 4 and D

			Production	Transport	Installation	End-of-life				Recovery
Indicator	**Abbr.**	**Unit**	**A1 – A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential	GWP	kg CO_2 eq	0.160	0.00333	0.00855	1.43E-05	1.12E-04	0	5.19E-04	-0.0111
Global warming potential – fossil	GWP-f	kg CO_2 eq	0.159	0.00333	0.00845	1.36E-05	1.12E-04	0	5.02E-04	-0.0111
Global warming potential – biogenic	GWP-b	kg CO_2 eq	8.44E-04	5.16E-07	9.85E-05	6.46E-07	1.75E-08	0	1.72E-05	-2.66E-06
Global warming potential – land use and land use change	GWP-luluc	kg CO_2 eq	5.72E-05	4.39E-08	2.23E-06	1.66E-10	1.48E-09	0	1.88E-07	-4.21E-06
Depletion potential of the stratospheric ozone layer	ODP	kg CFC 11 eq	6.45E-13	2.85E-16	5.86E-14	3.16E-19	9.64E-18	0	1.16E-15	-6.95E-15
Acidification potential – terrestrial and freshwater	AP	Mol H+ eq	0.00105	2.10E-05	7.39E-05	6.86E-08	7.15E-07	0	3.06E-06	-2.60E-05
Eutrophication potential – freshwater	EP-fw	kg P eq	3.90E-07	5.52E-10	6.42E-08	2.49E-12	1.86E-11	0	6.16E-07	-8.43E-09
Eutrophication potential – marine	EP-m	kg N eq	2.47E-04	1.01E-05	1.79E-05	3.36E-08	3.56E-07	0	7.66E-07	-6.35E-06
Eutrophication potential – terrestrial	EP-t	Mol N eq	0.00271	1.11E-04	1.94E-04	3.68E-07	3.90E-06	0	8.38E-06	-6.85E-05
Photochemical ozone formation potential	POFP	kg NMVOC eq	7.61E-04	1.98E-05	0.00820	9.39E-08	6.96E-07	0	2.32E-06	-2.18E-05
Abiotic depletion potential – minerals & metals*	ADP-mm	kg Sb eq	3.29E-07	1.23E-11	1.12E-08	4.56E-14	4.13E-13	0	2.87E-11	-4.37E-10
Abiotic depletion potential – fossil fuels*	ADPf	MJ	3.49	0.0459	0.156	1.94E-04	0.00155	0	0.00778	-0.0936
Water scarcity*	WDP	m^3 world eq	0.00824	1.35E-05	0.00308	2.37E-08	4.56E-07	0	2.65E-05	-1.47E-04

* The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.
PCR2019:14 v1.3.3 discourages the use of the results of modules A1 – A3 without considering the results of module C (EPD International, 2024).

Resource use indicators

Table 18: Resource use indicators covering modules A1 – 3, C1 – 4 and D

			Production	Transport	Installation	End-of-life				Recovery
Indicator	**Abbr.**	**Unit**	**A1 – A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Renewable primary energy as energy carrier	PERE	MJ	0.360	1.66E-04	0.0302	1.70E-07	5.61E-06	0	9.28E-04	-0.00529
Renewable primary energy resources as material utilisation	PERM	MJ	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources	PERT	MJ	0.360	1.66E-04	0.0302	1.70E-07	5.61E-06	0	9.28E-04	-0.00529
Non-renewable primary energy as energy carrier	PENRE	MJ	3.46	0.0459	0.155	1.94E-04	0.00155	0	0.00792	-0.0944
Non-renewable primary energy as material utilisation	PENRM	MJ	0.0405	0	0.00134	0	0	0	0	0
Total use of non-renewable primary energy resources	PENRT	MJ	3.50	0.0459	0.157	1.94E-04	0.00155	0	0.00792	-0.0944
Use of secondary material	SM	kg	0	0	0	0	0	0	0	0
Use of renewable secondary fuels	RSF	MJ	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	NRSF	MJ	0	0	0	0	0	0	0	0
Use of net fresh water	FW	m^3	8.22E-04	2.67E-07	1.49E-04	4.44E-10	9.05E-09	0	9.82E-07	-1.42E-05

Waste and output flow indicators

Table 19: Waste material and output flow indicators covering modules A1 – 3, C1 – 4 and D

			Production	Transport	Installation	End-of-life				Recovery
Indicator	**Abbr.**	**Unit**	**A1 – A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	HWD	kg	4.62E-08	3.32E-14	1.52E-09	1.20E-16	1.12E-15	0	1.98E-13	2.72E-12
Non-hazardous waste disposed	NHWD	kg	0.00441	9.88E-07	0.00183	2.19E-09	3.34E-08	0	0.0236	-1.41E-04
Radioactive waste disposed	RWD	kg	3.47E-05	6.64E-09	2.93E-06	5.98E-12	2.25E-10	0	8.77E-08	-5.27E-07
Components for re-use	CRU	kg	0	0	0	0	0	0	0	0
Materials for recycling	MFR	kg	0	0	0.00633	0	0	0	0	0
Materials for energy recovery	MER	kg	0	0	0	0	0	0	0	0
Exported electrical energy	EEE	MJ	0	0	0	0	0	0	0	0
Exported thermal energy	EET	MJ	0	0	0	0	0	0	0	0

PCR2019:14 v1.3.3 discourages the use of the results of modules A1 – A3 without considering the results of module C (EPD International, 2024).

Biogenic carbon content indicators

Table 20: Biogenic carbon content covering modules A1 – 3, C1 – 4 and D

			Production	Transport	Installation		End-of-life			Recovery
Indicator	Abbr.	Unit	A1 – A3	A4	A5	C1	C2	C3	C4	D
Biogenic carbon content – product	BCC-prod	kg	0	0	0	0	0	0	0	0
Biogenic carbon content – packaging	BCC-pack	kg	0	0	0	0	0	0	0	0

Additional environmental impact indicators

Table 21: Additional environmental indicators covering modules A1 – 3, C1 – 4 and D

			Production	Transport	Installation		End-of-life			Recovery
Indicator	Abbr.	Unit	A1 – A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG^	GWP-GHG	kg CO_2 eq	0.159	0.00333	0.00852	1.37E-05	1.12E-04	0	5.03E-04	-0.0111
IPCC AR5 GWP (excluding biogenic carbon)*	GWP-GHG (IPCC AR5)	kg CO_2 eq	0.159	0.00333	0.00852	1.36E-05	1.12E-04	0	5.03E-04	-0.0111
Respiratory inorganics	PM	Disease incidence	1.59E-08	1.46E-10	1.17E-09	7.81E-13	2.84E-12	0	3.43E-11	-3.78E-10
Ionising radiation – human health+	IR	kBq U235 eq	0.00385	8.29E-07	3.14E-04	6.10E-10	2.81E-08	0	8.47E-06	-4.79E-05
Eco-toxicity – freshwater§	ET-f	CTUe	1.47	0.0199	0.132	4.54E-05	6.71E-04	0	0.0344	-0.0181
Human toxicity – cancer§	HT-c	CTUh	8.86E-11	3.29E-13	3.89E-12	7.53E-16	1.11E-14	0	5.28E-13	-1.53E-11
Human toxicity – non-cancer§	HT-nc	CTUh	3.45E-09	6.96E-12	6.74E-10	1.65E-14	2.35E-13	0	5.67E-11	-3.60E-11
Land use related impacts/soil quality§	LU	PT	0.337	8.41E-05	0.0236	1.67E-07	2.84E-06	0	6.63E-04	-0.00573

^ This indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero. It has been included in the EPD following the PCR.

* GWP-GHG (IPCC AR5) is an additional GWP100 indicator that is aligned with the Intergovernmental Panel on Climate Change (IPCC) 2013 Fifth Assessment Report (AR5) (IPCC, 2013), national greenhouse gas reporting frameworks in Australia and New Zealand and previous versions of the Construction Products PCR (PCR2019:14v1.11). It excludes biogenic carbon and indirect radiative forcing.

+ This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator

§ The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

EN15804+A1 environmental impact indicators

Table 22: Environmental impact (EN15804+A1) indicators covering modules A1 – 3, C1 – 4 and D

			Production	Transport	Installation		End-of-life			Recovery
Indicator	Abbr.	Unit	A1 – A3	A4	A5	C1	C2	C3	C4	D
Global warming potential (total)	GWP (EN15804+A1)	kg CO_2 eq	0.158	0.00331	0.00847	1.42E-05	1.11E-04	0	5.13E-04	-0.0111
Depletion potential of the stratospheric ozone layer	ODP (EN15804+A1)	kg CFC-11 eq	7.67E-13	3.35E-16	6.92E-14	3.72E-19	1.13E-17	0	1.36E-15	-8.19E-15
Acidification potential of land and water	AP (EN15804+A1)	kg SO_2 eq	8.42E-04	1.45E-05	5.95E-05	4.75E-08	4.88E-07	0	2.45E-06	-2.09E-05
Eutrophication potential	EP (EN15804+A1)	kg $(PO_4)^{3-}$ eq	9.11E-05	3.42E-06	6.69E-06	1.13E-08	1.20E-07	0	5.31E-06	-2.20E-06
Photochemical ozone creation potential	POCP (EN15804+A1)	kg Ethene eq	6.75E-05	-5.52E-06	0.00123	4.63E-09	-1.83E-07	0	1.86E-07	-3.68E-06
Abiotic depletion potential – elements	ADP-e (EN15804+A1)	kg Sb eq	3.29E-07	1.23E-11	1.12E-08	4.56E-14	4.15E-13	0	2.92E-11	-4.41E-10
Abiotic depletion potential – fossil fuels	ADP-f (EN15804+A1)	MJ	3.37	0.0458	0.147	1.93E-04	0.00154	0	0.00552	-0.0909

PCR2019:14 v1.3.3 discourages the use of the results of modules A1 – A3 without considering the results of module C (EPD International, 2024).

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Image credits

Cover: SCION Innovation Hub - Te Whare Nui o Tuteata LVL and CLT structure, wood screens, handrails and leaners finished in Resene Aquaclear, plasterboard in Resene SpaceCote Low Sheen tinted to Resene Bokara Grey and Resene Rice Cake and trims in Resene Lustacryl. Winner of a Resene Total Colour Neutrals Award. Project by RTA Studio and Irving Smith Architects. Build by Watts and Hughes Construction. Painting by Passive Fire Co. Image by Patrick Reynolds.

Page 2: Maitahi Quarter Townhouse timber interior finished in Resene Colorwood Whitewash and Resene Aquaclear. Painted surfaces finished in Resene Wan White and Resene Triple Masala. Project by JTB Architects. Build by Salter Builders. Painting by Smiths Painting. Image by Jason Mann. From the Resene Total Colour Awards.

Page 6 and 7: Sandhill House timber walls and ceiling finished in Resene Colorwood Rock Salt and Resene Aquaclear. Truss plates painted in Resene Bright Spark, Resene FOMO, Resene Havoc and Resene Picton Blue. Winner of a Resene Total Colour Residential Interior Colour Maestro Award. Project by Max Warren Architect. Build by McKenzie Builders Ltd. Painting by Shamrock Painting Ltd. Image by Christopher Collie.

Page 9: MC Te Kāuta timber cupboards, feature slats, divider walls and detailing in Resene Aquaclear, feature murals in Resene Lumbersider Low Sheen in Resene Nero, Resene Alabaster, Resene Smoke Tree, Resene Smitten, Resene Half Turbo, Resene Roadster, Resene Black, Resene Candy Floss, Resene Vibe, Resene Alert Tan, Resene Belladonna, Resene Tulip Tree, Resene Bardot, Resene Bright Spark and Resene Red Berry, general walls in Resene Triple Tana and bulkhead in Resene Nero. Winner of a Resene Total Colour Commercial Interior Office Colour Maestro Award. Project by Sophie Burns, Anna Kean Pritchard, Christopher Gough Palmer, David Storey, Guy Whateley, Emma Harney of Burning Red Design + Saturday Creative. Architectural specifier Jasmax. Painting by Impact Interiors. Mural artists Charles and Janine Williams. Image by Jono Parker.

Programme-related information and verification

Declaration owner	**Resene Ltd** Web: www.resene.com Email: update@resene.co.nz Post: 32-50 Vogel Street, Naenae, Lower Hutt, Wellington 5011 New Zealand the paint the professionals use
Geographical scope	New Zealand
Reference year	1 Sep 2020 to 31 Aug 2021
EPD produced by	**thinkstep Ltd.** LCA Practitioner: Barbara Nebel LCA PM: Gayathri Gamage LCA Analyst: Chanjief Chandrakumar Web: www.thinkstep-anz.com Email: anz@thinkstep-anz.com Post: 11 Rawhiti Road, Pukerua Bay, Wellington 5026 New Zealand
EPD Programme	**The International EPD® System** Operator: EPD International AB Web: www.environdec.com Email: info@environdec.com Post: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden
Regional programme	**EPD Australasia** Web: www.epd-australasia.com Email: info@epd-australasia.com Post: EPD Australasia, 315a Hardy Street, Nelson 7010 New Zealand Phone: NZ: +64 9 889 2909 AU:+61 2 8005 8206
CEN standard EN 15804 serve as the core Product Category Rules (PCR)	
PCR	PCR 2019:14 Construction Products version 1.3.3 of 2024-03-01 (valid until 2024-12-20)
PCR review conducted by	**The Technical Committee of the International EPD System.** See www.environdec.com for a list of members. **Review chair: Claudia A. Peña, University of Concepción, Chile.** The review panel may be contacted via the Secretariat: www.environdec.com/support
Independent verification of the declaration and data, according to ISO 14025:2006	☐ EPD process certification (Internal) ☑ EPD verification by individual verifier
Third party verifier, approved by EPD Australasia	**Andrew D. Moore** Company: **Life Cycle Logic Pty. Ltd.** Web: www.lifecyclelogic.com.au Email: andrew@lifecyclelogic.com.au Post: PO Box 571, Fremantle, WA 6959 Australia
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ Yes ☑ No
Version history:	1.0

Resene
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Meet the Resene specifier and project service team
www.resene.com/meet-the-team