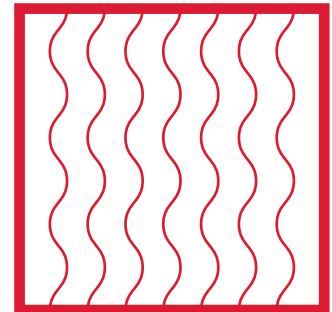


TILES



WOOD

INSULATION



LET'S CREATE NEW LIFE TOGETHER

UPCYCLE CHALLENGE

BE INSPIRED BY THE BEST IDEAS FROM
THE CROWD SOURCING CAMPAIGN



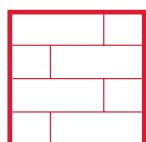
Enemærke &
Petersen a/s

UPCYCLE CHALLENGE



WOOD

Converting waste wood into pallets	4	Wooden coat rack for your hallway	8
Pots of recycled wood	4	Artistic garden interior	8
Eco prefabricated house envelopes	5	Suspended ceiling lighting from recycled planks	8
Sustainable and changeable walls	5	Acoustic panels of recycled planks	9
Waste wood into a series of household items	6	Rustic steak cutlery	9
VELUX roof windows made of recycled wood	6	A recycled wood stool	9
Wooden hitchhiking stops built from scrap wood and leftover materials	6	The winner ReSkur (ReShed)	10
Wooden pallet collection and outdoor furniture	7		
Modular pieces for festivals	7		



TILES

2nd prize Upcycling of bricks as cement replacement in building components	12	Discarded bricks reborn as facade elements	18
3rd prize Pantiles as facade system	14	Bench built with discarded roof tiles	18
A permaculture spiral	15	Grains for hourglass	19
Utilization of crushed bricks for aggregate	15	Chalk made from brick dust	19
A decorative tile terrace	15	Wine rack made from tiles	19
Mineral flour for sandblasting	16	Bricks made from coffee waste	20
Brick design for landscape	16	Roof tiles for interior design	20
Unbreakable plates made of brick and tile	16	Hand soap made from rubble	20
Bricks and roof tiles as filler	16	Cat litter made from tile and rubble	21
Highway noise barriers of tile	17	Mineral fertilizer from roof tiles and rubble	21
Paving stones made from cast-off bricks	17	A hollow metal brick	21



INSULATION

From discarded pavilions to homeless shelters	22	An eco-friendly rock wool mattress	25
Glass, bottles and decorations of glass wool	22	A rock wool rope	25
Upcycling insulation into a waterproofing solution	23	Doorstopper	26
Shower glass panel made from recycled glass wool	23	Easycap	26
Minimalist bulletin boards	23	Laminate and parquet underlay made of rock wool	26
Industrial carpets and rugs	24	Protecting plants and trees in the winter	27
Decorative hourglass	24	Rock wool balls for insulation	27
Thermal and acoustic insulating wallpaper	24	Roller blinds made from rock wool	27
Rock wool duvet and pillow	25		



How do we bring new life to used building materials? That was the focus of Enemærke & Petersen's crowdsourcing campaign "Upcycle Challenge".

In Denmark, the building industry is responsible for 30% of society's waste – and the industry uses more than 40% of our resources. Building materials are left over in abundance, but the Upcycle Challenge hopes to develop more sustainable solutions to this problem.

We joined forces with the innovation association BLOXHUB to start the crowdsourcing campaign, Upcycle Challenge. The goal was to collect innovative ideas on how to create new sustainable use of old building materials – and then hopefully make the best ideas a reality.

We asked for ideas for upcycling of used brick, roof tiles, wood and insulation (glass, paper, wool) and received 55 great solutions from scientists, students, companies and entrepreneurs.

Krydsrum Architects, a passionate architectural firm, was the winner of the Upcycle Challenge. With their innovative solution, "Reskur" (Reshed), the architects proposed to use discarded materials to build new sheds for storage, bikes and garbage disposal. Enemærke & Petersen is excited at the prospect of implementing the "Reskur" idea in its daily work with renovating roofs.

"It's an idea, we can implement directly into our work," says director Lars Jess Hansen. "We already deliver all the materials. Now we can recycle the materials while offering the residents in the building to construct a bike shed from their own roof. Or we can store the used materials and use them to make ready-made shacks and sheds in our factory."

The second place in the competition went to the firm Tredje Natur with the idea that broken brick and tiles are used as adhesives and as a replacement for cement. Third place went to the architectural firm Vandkunsten and the solution, "Pantile as Facade System," recycling roof tiles as facade materials through a specially designed mounting solution.

As the winner, Krydsrum Architects received a cash price of 30.000 DKK and can additionally look forward to developing their solution further together with BLOXHUB and Enemærke & Petersen. Tredje Natur (2nd prize) won 20.000 DKK and Vandkunsten (3rd prize) 10.000 DKK.





WOOD

Just over 100.000 tons of waste wood is generated annually in Denmark. Most of the waste wood is destined for uses such as biofuel or wood chips, because there's currently no way of testing or guaranteeing the durability or health of the waste wood. This means that an untapped resource of waste wood remains available for recycling.

The benefits of recycling wood are substantial, especially when it's reused on-site. Recycling wood directly on the construction site benefits the environment and the business' bottom line by reducing cost, transportation risk and disposal of the wood. It's a win-win for everyone involved.

CONVERTING WASTE WOOD INTO PALLETS

Kurt Fiskbæk, Regitze Fiskbæk



THE IDEA:

The benefits of recycling waste wood are numerous, including preserving trees, protecting habitat and providing cleaner energy. One of the ways to effectively recycle waste wood is by converting it into pallets.

DESCRIPTION OF SOLUTION:

We would take waste wood from kitchens, floors, spears and lacquered wood, and divide it into categories from 0-100. Then we would take out iron, nail screws and reduce it to 0-10 categories. After that, the wood would be mixed with glue and then heated and pressed into a finished pallet.

RESULT:

We expect a conversion of 25,000 tonnes of waste wood during the first year. From the third year, we'll have 55,000 tonnes of waste wood, and by year five we will recycle 100,000 tonnes of waste tree. The wooden pallets can be used in pallet production.

POTS OF RECYCLED WOOD

Rasmus Stokholm

THE IDEA:

I would create an herb pot of recycled wood that can replace plastic pots and follow the plant throughout its lifetime.

ECO PREFABRICATED HOUSE ENVELOPES

Mohamed Elbangy



THE IDEA:

To create well-insulated building envelopes from three types of recycled wood: **Wall panels**, like frames, ground and roof joists and beams. **Inner composition**, like wall panels, roof and ground insulation, and finally **exterior finish and interior works**.

DESCRIPTION OF SOLUTION:

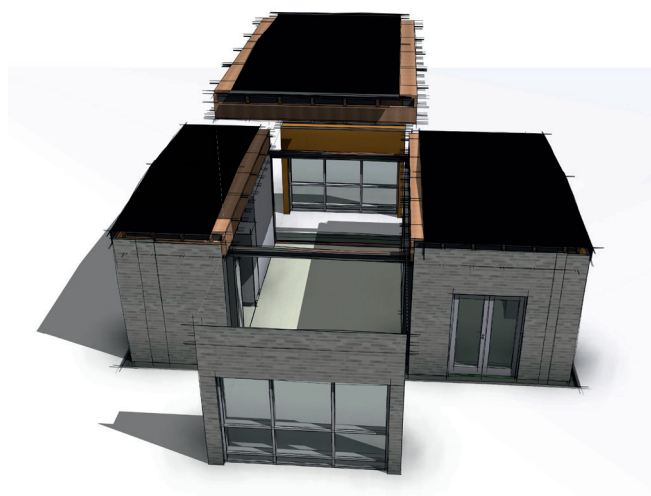
The wood is chipped into smaller pieces. Then the produced fibres mixture is sprayed with wax and dried using hot air. The fibres are then sprayed with natural resin as a binder and put inside the wooden frames with compression before being hardened through a mix of air and water vapour.

RESULT:

The inner composition of wall panels, roof and ground insulation has good U-value that works well for cold climate due to the mixture of wood fibres. It's also breathable and therefore moisture regulating which comes in handy on warm summer days. This will increase the indoor temperature throughout the year that leads to reduce the energy consumption and carbon emissions.

SUSTAINABLE AND CHANGEABLE WALLS

Alina Hurciuc, Martin Niminski, Morten Robinson, Anekdotestudio



THE IDEA:

Old rafters can be recycled into new removable wall constructions. These walls can be changed as needed.

DESCRIPTION OF SOLUTION:

In the demolition of an existing building the roof tiles and roofs are first removed. Then it's easier to remove the rafters, after which they're driven to Enemærke & Petersen's own production for processing. In order to maintain the material's natural design features, the tree will be highlighted in the design of the new prefabricated wall. For instance by letting the spear tree show on the inside.

RESULT:

We expect to recycle 90% of the wooden rafters. We will do this by digitizing the bars and running computer simulation where the bars should be cut to achieve the best degree of utilization.



WASTE WOOD INTO A SERIES OF HOUSEHOLD ITEMS

Owen Henderson

THE IDEA:

My idea is to turn waste wood into household products.

DESCRIPTION OF SOLUTION:

Most waste wood can with minor alterations become household items such as candleholders, desk organisers and knife racks or larger products like tables and lamps.

RESULT:

The resource consumption reduction is difficult to quantify. It could however be seen as adding another lifecycle to waste wood. Perhaps the effect could be in the perception of waste wood.

VELUX ROOF WINDOWS MADE OF RECYCLED WOOD

Matthias Dommert

THE IDEA:

To use wood from old buildings to produce the well-known VELUX roof windows. Wood is already a green material and by upcycling it to new building components instead of burning it as firewood, we're adding at least one cycle. The VELUX windows can either be produced as ordinary roof windows where all defects, like nail holes, are removed or they can be produced with their *history* visible.

DESCRIPTION OF SOLUTION:

The VELUX roof windows have to meet all technical demands and specifications as ordinary roof windows. For example, PEFC is certified recycling wood available from a supplier in the Netherlands.

WOODEN HITCHHIKING STOPS BUILT FROM SCRAP WOOD AND LEFTOVER MATERIALS

Carsten Theede



THE IDEA:

We want to build temporary, artistic and pop-up wooden hitchhiking stops and sculptures all over Denmark to promote better use of resources, trust and curiosity.

DESCRIPTION OF SOLUTION:

We created prototypes in Copenhagen and Aarhus, and now we want to co-create with citizens in the centre of Roskilde. Together with locals, we would build a big sculpture and small thumb sculptures in a one-day workshop. These small thumbs will be placed at locations where official hitchhiking stops could potentially be placed. The locations are mapped during the day with the expertise of locals, who know the best roads with massive traffic out of the city. We would use the temporary wooden sculptures as proto- and prototypes of the official ones.

RESULT:

We hope to create a whole new way of envisioning future sustainable mobility with the added value that strangers meet up and prejudice is eliminated one lift at a time. The effect is a trustful and curious Denmark that shares stories, resources and creative ideas on the go.

WOODEN PALLET COLLECTION AND OUTDOOR FURNITURE

Alex Kimber

THE IDEA:

I would create a local pallet collection network aimed at delivering readymade pallet furniture or raw pallet wood for hobbyists. Local construction companies would supply the recycled wood.

DESCRIPTION OF SOLUTION:

It would be best to start small and build upon local success before scaling up. This system could be cheaply and simply implemented on university campuses, festivals like Roskilde and rapidly developing areas with lots of construction sites and a growing local economy.

RESULT:

The effect of the solution includes:

- Increasing the longevity of a pallet by increasing its value (upcycling), not decreasing it (recycling).
- Building a community focused on upcycling and sustainable consumption.
- Increasing awareness of material waste.
- Reducing the number of pallets lost to neglect.



MODULAR PIECES FOR FESTIVALS

Sofia Garin Martinez, Anna Queralt Fuentes



THE IDEA:

A modular solution that allows flexible spaces for temporary events and festivals. In addition, we would like to include user experience to promote creativity and inclusion of everyone.

DESCRIPTION OF SOLUTION:

To create the modular pieces, we would cut the wood in similar shapes in order to create modules. Then, we would get all the small wooden pieces and merge them into a modular shape. As a final step, we would crush the bricks and roof tiles to small pieces, put them into a mould in the oven and create new modular pieces.

RESULT:

The result is a triple bottom impact: By using materials that are already extracted and processed, we reduce the number of resources and energy that these processes require. Also, it makes the local community and citizens aware of recycling material and upcycling processes. Finally, it's a new business opportunity that creates capital out of assets whose value was nearly zero.

WOODEN COAT RACK FOR YOUR HALLWAY

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

My idea is to design a wooden coat rack in natural colours. We could also use a hardener to create a unique play of colours.

DESCRIPTION OF SOLUTION:

First, the recycled wood is stabilized so the back piece and buds are fit for daily use. For this project, we'll use wood chips that can be polished and sanded to the shapes we want. The look will fit nicely into modern interior.

The coat rack in natural colour is made from larger wood pieces, whereas the one we harden can be made from wood chips. The methods would need some testing.

RESULT:

Both raw and treated wood can be used.

ARTISTIC GARDEN INTERIOR

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

To make artistic and unique interior for the garden.

DESCRIPTION OF SOLUTION:

Old wood is turned into sawdust, wood chips and both small and large pieces of wood. With the right hardener, you can make outdoor furniture, toys and art that can withstand the elements all year round. I suspect the mould would be the biggest challenge.

RESULT:

All types of recycled wood can be used. After the wooden garden interior is manufactured, it can be sold in construction markets and large garden centres.

SUSPENDED CEILING LIGHTING FROM RECYCLED PLANKS

Ulla Andersen

THE IDEA:

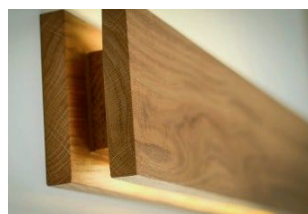
My idea is to use recycled planks for suspended ceiling lighting.

DESCRIPTION OF SOLUTION:

Suspended ceiling lighting can be made of two equally large recycled planks that are fixed around a smaller plank. The LED or LED fluorescent lamps are installed below the centre rod while the transformer and suspension are concealed on top.

RESULT:

The recycled planks will give the interior a warmer and more personal expression than on the photos. They would fit in nicely at home and in office buildings.



ACOUSTIC PANELS OF RECYCLED PLANKS

Ulla Andersen



THE IDEA:

To manufacture acoustic panels from recycled planks. The acoustic panels can be used as wall panels in larger office buildings, at home, as list ceiling or high wall panels.

DESCRIPTION OF SOLUTION:

Recycled planks are unique because of their patina and old paint. So I would keep these small imperfections. If the planks are sanded, they can be difficult to work with because hidden nails easily damage the saw blades. By leaving the wood as is, it keeps its warm and personal expression - one that's difficult to achieve with new wood.

RESULT:

The recycled boards are set on a wood or metal cassette (depending on the size of the panel). The planks are placed on acoustic fabric with acoustic insulation at the back with 10 mm spacing.

RUSTIC STEAK CUTLERY

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

To create rustic cutlery from recycled wood. By hardening the recycled wood, we would achieve an exclusive and rustic look.

DESCRIPTION OF SOLUTION:

Wood must be fairly porous to be hardened properly; so recycled wood is ideal for this purpose. As part of the process, we would need hardener and a vacuum chamber. The cutting process can be done by machine or manually by hand. The goal is making the cutlery dishwasher-friendly.

RESULT:

Wood pieces down to approx. 10x5x5 can be used. Because of this, it's possible to recycle a large part of all untreated wood in the construction industry.

A RECYCLED WOOD STOOL

Ulla Andersen



THE IDEA:

To make a stool of recycled wood.

DESCRIPTION OF SOLUTION:

First step is to assemble the recycled wood in different sizes and lengths with an industrial ratchet strap. The surface is then grinded and oiled using a blank lacquer to achieve a soft surface.

RESULT:

A temporary chair solution for festivals, public meetings, city parties, etc.

WINNER



RESKUR (RESHED)

Niels Jakubiak Andersen, Hasse Selvig Sandell (Krydsrum Arkitekter)

THE IDEA:

Direct recycling of roof materials (pantile, slate, bricks, beams, laths and gutters) from roof renovation into unheated storage rooms for bicycles, waste, gear, carports, etc.

The problem with sheds on the market today is that they typically don't match the environment. They are unattractive and of course they cost energy to produce. In our solution, "ReSkur", there is direct recycling of wood, tile and insulation. Therefore, ReSkur is an overall solution for all three categories in this competition.

DESCRIPTION OF SOLUTION:

Roof renovations are estimated to make up 25% of the DKK 100bn annual renovations in Denmark. This is a substantial source of good quality materials with long residual life. Streamlining construction methods (off-site prefabrications, etc.), increased energy requirements, potential for densification, e.g. in the form of roof houses, often result in a complete demolition of the entire structure when a roof renovation is carried out. The demolition must also happen quickly and efficiently in order not to delay or make the process more expensive.

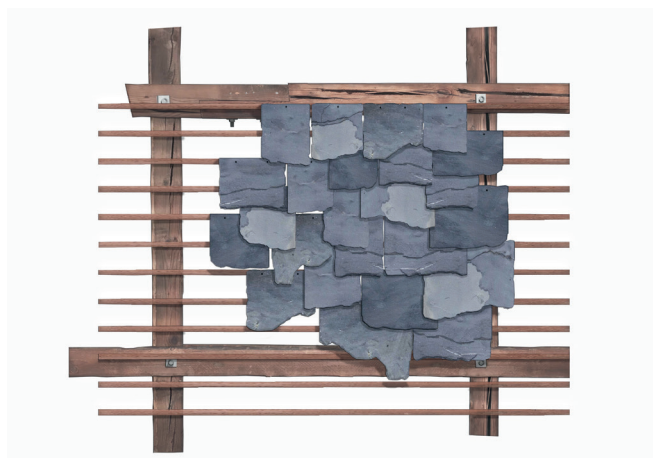
Our project relies on the fact that cut materials can be used just as well as whole and intact materials. We believe we can achieve a high aesthetic value with a quality design. At the same time, we have our Danish craftsmanship heritage at our core, including solutions we have known and used for centuries, like half-timbering and rough stone pavement.



Once tested and sold, the product achieves a certain brand effect and you would have built up material stocks of the excess materials. At this point, we believe the product can be scaled to other markets like detached houses, commercial buildings, cultural centres and such. There is no obvious connection between roof renovations and the sheds locally, except that the on-going source of materials naturally comes from different roof structures around the country and must be stored before reuse.

RESULT:

In Denmark, annual renovations on our existing properties amount to DKK 100 billion. We estimate that 25% of these are roof renovations at DKK 25 billion in annual revenue.



Here's how we calculate it: Let's say that each roof renovation on 400 m² roof (typical Copenhagen property with stairway) includes a 40 m² shed construction, which is 10% of the area at 1500 DKK / m² ex VAT. That would amount to DKK 60.000 ex VAT for a 40 m² ReSkur.

If we assume that 20% of roof renovations include new sheds, and at the same time a parallel market for sheds in general (without roof repair), the total market size would be DKK 300 million a year. And if ReSkur realistically can take 10% of this market, this corresponds to 30 million a year in annual revenue.

This turnover which amounts to approx. 20.000 m² "new" shed roof area would with newly produced sheds in

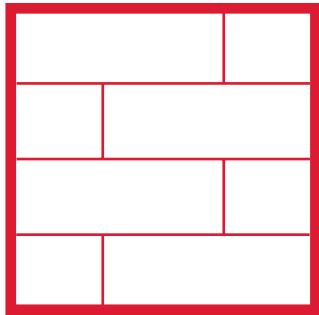
galvanized steel have had a negative imprint of around 12.500 T CO₂ per year, which we would save (apart from the marginal energy consumption for pole foundation and possibly transport).

A 40 m² galvanized shed would, with its relatively large production energy costs, deduce 1500 kilo of CO₂. Aluminium would be double that amount and in lime wood it would be half (37.5 kg per m²).

So, a reasonable average here tells us that by recycling the roof materials for ReSkur with the above estimated area, we would save 750 ton CO₂ annually. And if Reskur took over the entire estimated market, the CO₂ reduction would be 10 times higher.

ReSkur can pave the way for increased resource thinking and recycling quality materials in renovation. Also, it can from the very beginning be a sustainable business that can be put into production tomorrow.





TILES

Currently, 200.000 tons of brick and tile waste is disposed of annually within the building industry in Denmark. However, the market for recycling the material is fairly undeveloped at this point.

One of the recycling challenges is that cement mortar can't be removed without damaging the material. As a result, 95% of bricks and tiles are converted into gravel. The ideas presented here address the creation of products from recycled and upcycled bricks and tiles.

#2



UPCYCLING OF BRICKS AS CEMENT REPLACEMENT IN BUILDING COMPONENTS

Flemming Rafn Thomsen, Jeppe Ecklon (Tredje Natur)

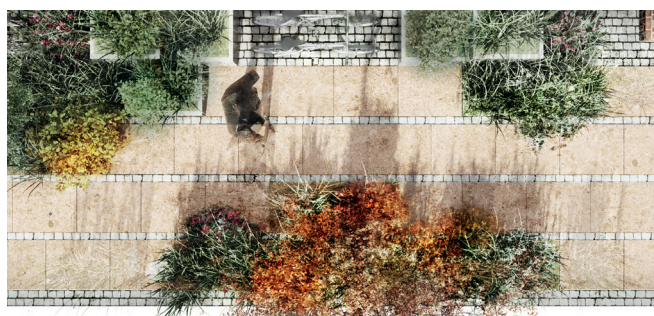
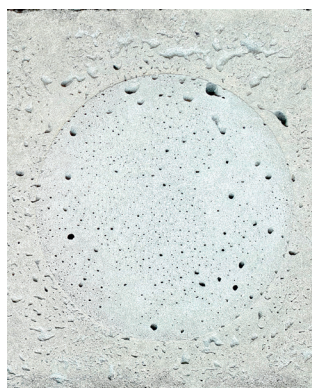
THE IDEA:

The idea by TREDJE NATUR and DTU Byg is to use finely crushed bricks as a cement replacement. The potential of reducing the amount of cement in concrete building components is an improved carbon footprint plus a reuse of discarded bricks.

DESCRIPTION OF SOLUTION:

DTU Byg and TREDJE NATUR estimates that up to 30% of cement can be replaced with finely crushed bricks and still maintain structural properties equal to conventional concretes. For this project, we will conduct a laboratory study to specify the right ratio of which cement can be replaced with finely crushed waste bricks. This study entails a brief evaluation of the 30x100x100mm cast samples of concrete mixtures.

At the same time, DTU Byg and TREDJE NATUR will conduct an aesthetic evaluation of colour. This study is extremely relevant, because it's now possible through the colour to see which concretes are done with an optimized carbon footprint. Next level is to use the footprint-improved recipe to cast the Climate Tiles and install them at our test site at Heimdalsgade.



Parallel to these studies, we aim to translate the properties to dry-mix concrete formula, allowing the innovation to meet the entire concrete block stone industry as well as the conventional wet-cast industry, and thereby expand the

territory of impact. The formula will be tested in an operational block stone facility.

RESULT:

From the figures in the Waste Statistics 2015, it appears that bricks in 2013 amounted to 106,000 tons while the figure in 2015 was 170,000 tonnes. Part of this amount can be recycled directly, but for the remainder it's necessary to find the right use with the highest possible profit. Therefore, part of the project is to answer how much cement consumption can be reduced, which is expected to be within 10-30% per m³ concrete.

As part of the project, we will estimate the decrease in CO₂ emissions. It's possible to reduce the emission by 5-30% per m³ of concrete, corresponding to the reduction that can be achieved by lowering the cement content and thus the chemical process when producing cement.

The size of the reduction of energy consumption for cement production per m³ produced concrete will be estimated as part of the project. We expect energy consumption to be reduced by 5-30% per m³ of concrete.

The above-mentioned calculations are performed by DTU Environment, based on data from TREDJE NATUR and DTU Byg.

#3



PANTILES AS FACADE SYSTEM

Asbjørn Staunstrup Lund (Vandkunsten)

THE IDEA:

This concept explores how we can reuse pantiles for a vertical building envelope. Facade claddings are less exposed and vulnerable than roof claddings that are estimated to last 50+ years. A pantile facade might add a generation to the total lifecycle of the component.

DESCRIPTION OF SOLUTION:

We developed a bracket to fit the hand-moulded pantile. This type of roof tile was selected because it's widely common and available in Denmark and has simple geometry.

The creation of one standard façade concept is challenged by the many variations of tile shapes. This means that custom solutions must be developed for each style of tile. The individual shapes are defined by the way the tiles interlock when stacked on a roof. For this material concept, the business model can be isolated to be the design and production of specialized mounting systems for a series of tiles. Customers or contractors source their own tiles; they order the mounting system that fits the particular tile.



RESULT:

Brick construction is the most traditional construction method and material in Denmark, and roof tiles have been a well-known and long-lasting construction component for centuries as well. Due to the now primary use of flat roofs as well as the use of alternative and cheaper materials, roof tiles are phased out of the market and disappearing from the roovescape. Every year, 230.000 tonnes of brick waste is produced in Denmark. As masonry remains an integral part of Danish building culture when afforded, reused bricks from masonry with lime-based mortar have become an established alternative on the Danish market of construction materials. Prices are now comparable with high-end new bricks.

Bricks are cleaned from mortar and reused as building envelopes, which is the highest level of reuse imaginable. Roof tiles are not reused directly as they are crushed and find use as secondary material in road construction as a stabilizing layer, mixed with crushed concrete. Pantiles are shaped to stack and they are as easily demounted as they are laid. As old roofs are changed, large amounts of roof tiles are available to source.

A PERMACULTURE SPIRAL

Kai Paludan-Müller



THE IDEA:

Upcycling bricks in a spiral format and filling the remaining gaps with dirt can create a simple yet functional herb or vegetable farm. The caretaking community can easily adjust the size of the permaculture spiral.

DESCRIPTION OF SOLUTION:

The beauty of the concept lies in the limited need for resources - it doesn't require any specific setting or underlay, no specific number of bricks, and the available water is naturally directed through all crops due to the spiral format. By providing a variety of popular crops, the permaculture spiral also has the potential of being the meeting point for a community.

Permaculture is key to a sustainable lifestyle. Using nature as a source of inspiration for living, citizens can come closer to living in compliance with and from nature - even in urban areas. Furthermore, the permaculture spiral can be personalized with messages and decorations on each brick, representing each member of the community.

RESULT:

The image shows a permaculture spiral prototype. It's a fully functional addition to our school (Kaospiloterne, Aarhus), and all students are free to use the herbs to freshen up their lunch.

UTILIZATION OF CRUSHED BRICKS FOR AGGREGATE

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

To use crushed clay bricks and tile waste instead of conventional gravel.

DESCRIPTION OF SOLUTION:

In order to be a success, the recycled aggregate must be heavy and mouldable just like conventional stabilization gravel.

RESULT:

In theory, all bricks and tiles can be utilized as long as they're up to par with the environmental requirements set by the government.

A DECORATIVE TILE TERRACE

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

My idea is to create a decorative driveway or tile terrace.

DESCRIPTION OF SOLUTION:

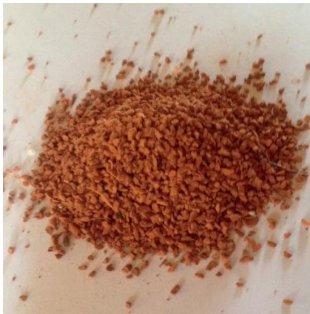
Brick and tile waste is crushed, sorted and classified into coarse and fine aggregates. The coarse aggregate is then swept down between the tiles, which leaves a rustic and unique look. The bricks must be sorted by colour before crushing so the product doesn't require further staining.

RESULT:

All types of bricks and tiles can be utilized.

MINERAL FLOUR FOR SANDBLASTING

Rene Lemmiche



THE IDEA:

My idea is to make mineral flour from brick and roof tile and use it for sandblasting.

DESCRIPTION OF SOLUTION:

The bricks and tiles are processed to particles in a drum before they're ready for high pressure sandblasting.

RESULT:

I see several benefits, but the main result is that the recycled tiles and bricks get added value and can be used for sandblasting at factories.

BRICK DESIGN FOR LANDSCAPE

Annelene Madsen, Mari-Louise Madsen

DESCRIPTION OF SOLUTION:

Pavement built from recycled bricks for landscaping.

UNBREAKABLE PLATES MADE OF BRICK AND TILE

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

My idea is to create unbreakable plates of bricks and tiles.

DESCRIPTION OF SOLUTION:

The goal is to make a durable and resistant plate for everyday use, which means it needs to be dishwasher and microwave-friendly. The main challenge is figuring out whether glazing is enough or if some kind of hardener is required as well. The plate must be surface treated so it doesn't crack or pose a health risk.

RESULT:

All types of cleaned brick and tiles without glaze can be utilized.

BRICKS AND ROOF TILES AS FILLER

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

To use bricks and tiles as filler.

DESCRIPTION OF SOLUTION:

Filler is a putty used to fill holes, small cracks and other minor surface defects. Typically, filler is composed of dolomite and different grain sizes, but I would replace the traditional grain with brick and tile grain.

The filler mass is mixed with binder, thickener, solvent and additive. To be a success, it must also be able to dry and act like regular fillers.

RESULT:

All bricks and tiles can be used.

HIGHWAY NOISE BARRIERS OF TILE

Ulla Andersen



THE IDEA:

Highway traffic noise tends to be a dominant noise source in urban and rural environments. But installing noise barriers that preserve aesthetic views and scenic vistas can reduce noise and improve quality of life for people who live nearby. My concept explores the idea of making a highway noise barrier of tile and plants.

DESCRIPTION OF SOLUTION:

First, I would stack the recycled roof tiles staggered, which inevitably creates a perforated wall. In those holes I would put soil and plants. The tiles can be set as whole surfaces or as part of a pattern like in the photo.

RESULT:

The benefits of this concept are great. Aside from the recycling aspect, the holes in the barrier absorb the sound, while the plants work as an acoustic component. Drivers and residents also perceive indirect benefits such as improved views.

PAVING STONES MADE FROM CAST-OFF BRICKS

Timea Lorincz



THE IDEA:

Finding a good place to recycle bricks can be tricky. But if a brick can be put back to use, it will cut down on mining, which is a win for the environment. One way to recycle bricks is to use them as outdoor paving stones.

DESCRIPTION OF SOLUTION:

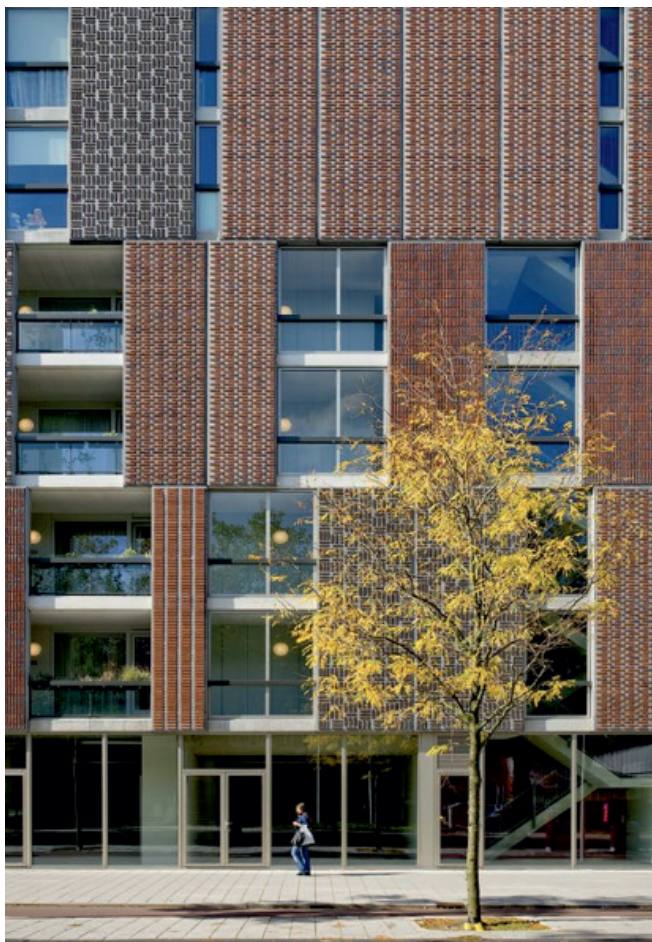
Larger spaces like public areas with single-coloured and uniform coating tiles easily look dull and monotonous. By using recycled bricks with natural paint residues, we would get a nice patina surface with varying structure when laid out in layers of gravel.

RESULT:

The surface treatment is the same for bricks and other paving stones.

DISCARDED BRICKS REBORN AS FACADE ELEMENTS

Ulla Andersen



THE IDEA:

I propose making facade elements of recycled bricks.

DESCRIPTION OF SOLUTION:

Recycled bricks can be used as facade elements if placed in large plates with same-size steel edges as the brick. Here, they will form a much more beautiful wall than fabricated bricks that are dull in large uniform surfaces. The tight steel frames will also provide the recycled stones with a more exclusive look and make them easier and faster to work with as facade elements, especially for larger constructions.

RESULT:

The recycled bricks have a rustic look and should be used as building material.

BENCH BUILT WITH DISCARDED ROOF TILES

Ulla Andersen

THE IDEA:

A bench that salvages rooftop tiles that would otherwise be discarded.

DESCRIPTION OF SOLUTION:

The double-wing tiles are mounted on top of a simple wooden-frame construction to create a functional furniture piece. The bench is perfect for any public space like parks, train stations, bus terminals and town squares.

RESULT:

Bar stools on the photo are designed by Eindhoven designer, Tsuyoshi Hayashi, but they might as well be used as benches in public spaces.



GRAINS FOR HOURGLASS

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

I propose making an hourglass from brick and tile grains. The hourglass is ideal for interior and board games, while the dust can be used to make chalk.

DESCRIPTION OF SOLUTION:

Crushed bricks and tiles are separated from the dust so only the grains remain. The grains are then rinsed, treated and kept in a concealed container. Make sure they're completely clean and dry before continuing. Any condensation left in the hourglass will make the sand stick to the glass.

RESULT:

We can use all sorts of bricks and tiles.

CHALK MADE FROM BRICK DUST

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

I would make two kinds of chalk from brick and tile dust – one for business and one for children. The industrial chalk would replace the traditional spray chalk and therefore needs to be medium hardened. The result would be a pocketsize push-up container chalk, which is easy to utilize. The other is a softer chalk for children.

DESCRIPTION OF SOLUTION:

Tiles and clay bricks are sorted according to colour and then crushed to dust. The dust is then divided into two and mixed with hardener. The industrial chalk needs a water-proof medium hardener, while the children's chalk requires an easy wash-off soft hardener.

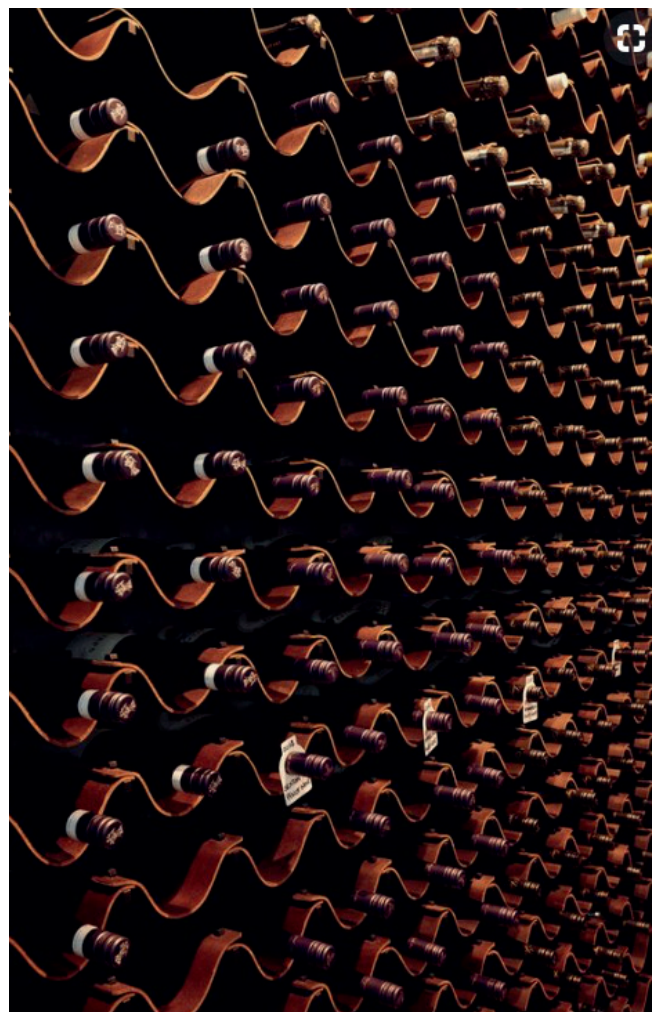
The goal is to create water- and windproof chalk for most surfaces, including damp surfaces.

RESULT:

All bricks and tiles can be used.

WINE RACK MADE FROM TILES

Ulla Andersen



THE IDEA:

A wine rack made from discarded roof tiles.

DESCRIPTION OF SOLUTION:

Drill a square grid on a wall, then mount round wood or metal bars in a 90-degree angle. Place the recycled roof tiles horizontally and store a bottle of wine on each tile. It's a modern solution that has the original wine cellar look.

RESULT:

The photo shows a wine rack made from leather, but it might as well have been made from roof tiles.

BRICKS MADE FROM COFFEE WASTE

Kim Christensen, Patrycja Lyszczyk, Praewa Samachai



THE IDEA:

Everywhere around the world a typical coffee shop produces 150 kg of coffee waste weekly. Instead of throwing it away, it can be upcycled as bricks.

DESCRIPTION OF SOLUTION:

With addition of water and natural soy protein, compressed in the form, ground coffee can be shaped to any form. It takes only 20 cups of coffee to produce one brick. It's sustainable and fully upcycled.

RESULT:

In this way, the simple idea reduces a lot of waste around the world. Upcycling ground coffee and using it as construction material in innovative ways helps make the world more sustainable.

ROOF TILES FOR INTERIOR DESIGN

Lars Bjerre

THE IDEA:

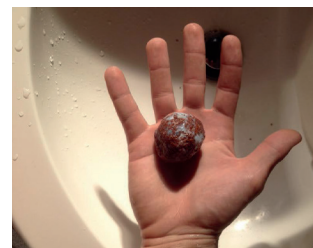
Roof tiles come in many colours, and patina makes every tile unique. For interior design, roof tiles can be used to create a wall with slats to add a raw and masculine element to the interior. Another idea is to display tiles below a glass table.

DESCRIPTION OF SOLUTION:

To create a lamellae wall from roof tiles, we would need to cut holes for the tiles and then mount them to the backside. The ideas are easy to test.

HAND SOAP MADE FROM RUBBLE

Rene Lemmiche



THE IDEA:

Today, hand soaps are made from fats and oils, but my idea is to make soap from granulated roof tiles with crushed rubble as an abrasive. The images show several of my prototypes of regular soap with granulated tile.

DESCRIPTION OF SOLUTION:

Clay, which is used to make tile, is a widespread component in beauty products, and its basic chemistry makes it ideal for soap, as this will reduce the discharge of harmful waste in nature. I have prepared several prototypes and in the attached pictures I have tested soap with abrasive effect on hands with dirty oil.

RESULT:

The abrasive is made from roof tiles and rubble and will therefore be more exclusive.

CAT LITTER MADE FROM TILE AND RUBBLE

Rene Lemmiche



THE IDEA:

My idea is to make cat litter from recycled roof tiles and rubble. On the photos you'll see conventional cat litter versus the product I've made from tile and rubble.

DESCRIPTION OF SOLUTION:

Cat litter is significantly more expensive than gravel, which adds a financial incentive to granulate tiles and rubble for cat litter.

RESULT:

There are several benefits to this idea - the cat litter is made from recycled rubble, which can be sold at a higher price. It's a win-win.

MINERAL FERTILIZER FROM ROOF TILES AND RUBBLE

Rene Lemmiche

THE IDEA:

My idea is to make mineral fertilizer out of rubble. Since all components of finely ground rubble are natural, this is an eco-friendly way to add nutrients to plant soil.

DESCRIPTION OF SOLUTION:

All roof tiles and rubble are crushed into fine raw powder, which without further processing is added to the soil as extra minerals. To make the mineral fertilizer commercial I would need to talk to a biochemist, an investor and an engineer.

RESULT:

Since the mineral powder is made from finely ground roof tiles and rubble, I believe this will reduce the production of gravel.

A HOLLOW METAL BRICK

Rene Lemmiche

THE IDEA:

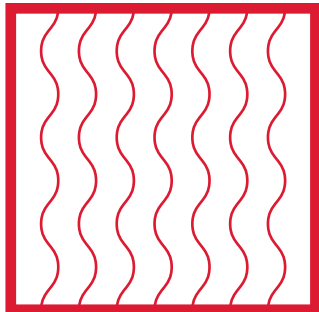
The traditional red brick is a protagonist through the interiors. However, I propose making a hollow metal brick to replace it to ensure recycling within the construction industry.

DESCRIPTION OF SOLUTION:

The 228x108x54mm brick exterior is made from metal, while the hole is formed by a cylindrical shaped structure to maximize the supported weight.

RESULT:

The metal brick have potential to partially or completely replace the traditional red brick. What's more, the metal value of the brick makes it financially beneficial to recycle.



INSULATION

In theory, glass wool, rock wool and paper wool can be recycled as insulation, but only when in good condition, which is rarely the case. In practice, this insulation material is mostly disposed of as waste through incineration or landfill. It's estimated that approx. 5-10% of the total insulation material is recycled.

There's currently no fully developed recycling market for insulation materials, but we hope to change that with the ideas presented in this publication.

FROM DISCARDED PAVILIONS TO HOMELESS SHELTERS

Jon Strunge

THE IDEA:

We would design temporary homeless shelters out of discarded festival and event pavilions to bring attention to the benefits of a low-waste, circular economy. This idea aims to demonstrate that flexible, sustainable architecture can be highly compatible with a comfortable modern lifestyle.

DESCRIPTION OF SOLUTION:

We would reuse discarded rods and plastic membrane in a functional and aesthetic construction system for temporary homeless shelters and larger event pavilions.

RESULT:

The project only needs waste and circular 3D printed biodegradable parts to succeed. It requires 5-10 discarded pavilions to construct one new social housing.

GLASS, BOTTLES AND DECORATIONS OF GLASS WOOL

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

Glass wool can be reused for several purposes. Drinking glasses, bottles or decorative ornaments are just a few examples of how it's possible to recycle it in a both economical and environmentally profitable way.

DESCRIPTION OF SOLUTION:

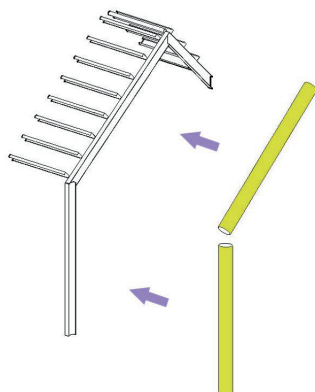
The glass wool is melted then shaped into drinking glasses, bottles or decorations. It's imperative that the glass wool is completely melted so all air bubbles are gone. We could add colour afterwards.

RESULT:

Only clean glass wool is suitable for the project.

UPCYCLING INSULATION INTO A WATERPROOFING SOLUTION

Conor Russon



THE IDEA:

Insulating material such as mineral wool or polystyrene can easily be repurposed into a cheap waterproofing solution that provides protection for on-going constructions.

DESCRIPTION OF SOLUTION:

We would take the recycled insulation out of its original form and clean it thoroughly. Then we would mix it with aluminium foil or coat it with Ground Granulated Blast Furnace Slag (GGBS) to produce a durable waterproofing sheet-based membrane. Once the insulation is coated with GGBS, we get a flexible, thin and durable product that repels water effectively.

RESULT:

The waterproofing solution can be utilized at on-going constructions overnight and outside of operation hours. Depending on the form (either a rolled or solid sheet-based membrane), the insulation could be wrapped to roof framing elements or applied on top of concrete slabs as well as other structural elements. The insulation can also be used to cover the top of unfinished and exposed wall constructions; by anchoring the insulation to either side of the top of the wall, it prevents rainwater and other materials from entering any cavities in the construction.

SHOWER GLASS PANEL MADE FROM RECYCLED GLASS WOOL

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

I propose making a shower glass panel out of glass wool.

DESCRIPTION OF SOLUTION:

The glass wool is melted to a solid mass such as stone or a whole plate. The surface must be completely smooth as otherwise it will gather mold due to the humid air. There cannot be any cracks in the surface.

RESULT:

I would use insulation glass wool for this project.

MINIMALIST BULLETIN BOARDS

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

The idea is to construct an architectural and minimalist bulletin board, preferably in colours. The frame is made from old compressed insulation paper, which is first bleached or dyed, then shaped. The board itself consists of insulation wool, which comes natural, bleached or coloured. I would also make accessories such as magnets, shelves and pockets.

DESCRIPTION OF SOLUTION:

Only raw wool can be used, and it must be woven or quilted. I prefer quilt, because it makes it easier to work with. Besides a basic rinse, the wool doesn't require treatment.

The frame is constructed from compressed and mouldable insulation paper, which is then hardened into shape. Similarly, the frame may be moulded and consist of epoxy and recycled wood pieces, both small and large. It could also be made from wood pieces alone. In addition, we should look at magnetic details and effects for the facade.

RESULT:

All insulation paper and rock wool can be utilized.

INDUSTRIAL CARPETS AND RUGS

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

My idea is to recycle raw insulation into cloths, carpets and rugs for auto repair shops.

DESCRIPTION OF SOLUTION:

First, I would apply colour to ensure a consistent look. Then, I would spin the insulation wool into a uniform and solid wire before waxing or hardening it to guarantee a durable, fireproof and long-lasting solution.

The cloth requires a few more steps before it's done. First off, the thread must be treated differently than when making carpets and mats. This is because a cloth must be able to absorb oil and remove engine grease, tar and grime. I believe this cloth is quite durable and long lasting.

RESULT:

I would use raw insulation wool for this idea.

DECORATIVE HOURGLASS

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

Glass wool can be reused in numerous ways. One of them is to make a decorative hourglass for interior and board games. The hourglass will be filled with recycled silicate grains.

DESCRIPTION OF SOLUTION:

The insulating glass wool is melted and then moulded into large and small hourglasses. We need to examine which melting process creates the best results. We're aiming for 50% transparency and zero air holes, but the latter could be a challenge.

RESULT:

Only clean or washed insulation glass wool can be utilized for this idea.

THERMAL AND ACOUSTIC INSULATING WALLPAPER

Sunna Ósk Þorvaldssdóttir



THE IDEA:

My idea is to make wallpaper out of rock wool to add extra thermal and acoustic insulation. The wallpaper wouldn't be glued to the wall – instead we would hang it from the ceiling so it's easier to install and take down.

DESCRIPTION OF SOLUTION:

First, I would find out how thick the wool needs to be to maximize thermal qualities. Then, I would work with a rock wool manufacturer, after which I'd find a suitable textile to cover the rock wool so the fibres don't pose a health risk.

RESULT:

The thermal and acoustic wallpaper would have several benefits. To name a few, it would provide extra insulation, fire safety and create awareness. Hopefully, this idea will encourage the public to bring waste rock wool to recycling stations.

ROCK WOOL DUVET AND PILLOW

Sunna Ósk Þorvaldsdóttir



THE IDEA:

The idea is to make rock wool filling for duvets and pillows that has the same benefits (and even more) than memory foam.

DESCRIPTION OF SOLUTION:

One solution is to divide the rock wool into smaller pieces, another is to re-melt it and make thin layers of filling into individual fabric pockets of duvets and pillows. As a final step, I would cover it with a breathable fabric that isolates and keeps in the wool fibres.

RESULT:

This idea would provide duvets and pillows made from eco-friendly rock wool, which is non-toxic and doesn't support growth of fungi, bacteria, vermin and pests.



AN ECO-FRIENDLY ROCK WOOL MATTRESS

Sunna Ósk Þorvaldsdóttir

THE IDEA:

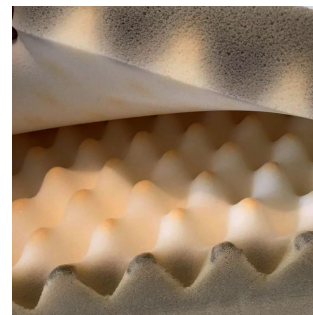
I see a need for organic mattresses made from non-toxic materials with zero mold risk. My idea is therefore to make mattresses out of recycled insulation.

DESCRIPTION OF SOLUTION:

The rock wool mattress comes with springs for comfort, and it's covered with a breathable fabric. First step is to find a breathable textile, and then we would have to figure out the density and material composition.

RESULT:

As a result, we would get an eco-friendly and non-toxic rock wool mattress that doesn't support growth of fungi, bacteria, vermin and pests, unlike a lot of mattress brands today.



A ROCK WOOL ROPE

Rene Lemmiche

THE IDEA:

I would make a rope out of rock wool.

DOORSTOPPER

Annelene Madsen, Mari-Louise Madsen

THE IDEA:

I propose making a doorstopper from crushed bricks and roof tiles, wrapped in a woven insulation woolsack.

DESCRIPTION OF SOLUTION:

First, spin the insulation wool into threads. Then weave it into a sealed casing in which the coarsely crushed bricks and tiles are placed. The bag must be well sealed to prevent dust or grains from getting out. Also, the wool wire must be woven fine and tightly enough to withstand impact. I suggest using a wax hardener before weaving.

RESULT:

The recycled insulating wool must be cleaned before use.

EASYCAP

Rene Lemmiche

THE IDEA:

My idea is called Easycap, and it insulates screws and nuts against cold, heat and rain. It also protects corrosion so it's easier to dismantle and recycle the materials without damage.

DESCRIPTION OF SOLUTION:

Easycap looks like a soda can lid and it's made from water repellent silicone with a rip-off plastic membrane, which makes it easy to put on. When the protective capsule is placed on a screw or nut, it acts as a protecting membrane. Easycap can be produced on assembly lines and sold to the construction industry and in construction markets.

RESULT:

Easycap optimizes durability and ensures higher quality of materials, insulation and components so they're fit for recycling.

LAMINATE AND PARQUET UNDERLAY MADE OF ROCK WOOL

Sunna Ósk Þorvaldsdóttir



THE IDEA:

My idea is to upcycle rock wool into a laminate or parquet underlay. Rock wool would be a great underlay for several reasons; it repels water, insulates acoustics, insulates temperature and doesn't attract mold.

DESCRIPTION OF SOLUTION:

We would begin by making layers of rock wool with different thickness, density and material composition for different kinds of flooring. Then, we make sure it meets the requirements of the building regulations concerning impact sound insulation between dwellings. Finally, we would work with a rock wool manufacturer.

RESULT:

Since the product is made from recycled, eco-friendly and natural materials, it can potentially encourage the public to bring waste rock wool to recycling stations.

PROTECTING PLANTS AND TREES IN THE WINTER

Ulla Andersen

THE IDEA:

This idea provides a little extra winter protection for plants and trees through recycled insulation.

DESCRIPTION OF SOLUTION:

The recycled insulation is probably already in pieces coming from the construction site. By storing it in biodegradable net bags in various sizes, it's possible to keep the plants from succumbing to the cold.

ROCK WOOL BALLS FOR INSULATION

Rene Lemmiche

THE IDEA:

My idea is to make recycled rock wool balls to simplify the process of attic, wall or floor insulation. Instead of spending hours cutting out and installing rock wool, these tiny balls would ease the process tremendously.

DESCRIPTION OF SOLUTION:

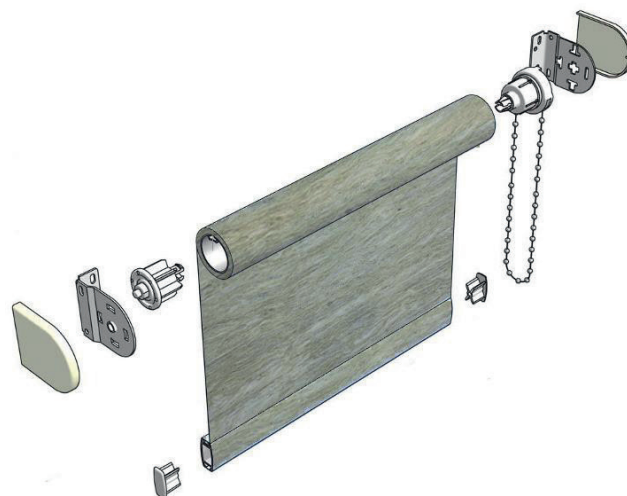
The rock wool balls are blown into the ceiling through a tube. At 2cm in diameter, they will fill out the ceiling in minutes as opposed to the traditional process of cutting out and installing the rock wool manually.

RESULT:

These tiny balls are produced from recycled rock wool, but we could also use new rock wool.

ROLLER BLINDS MADE FROM ROCK WOOL

Sunna Ósk Þorvaldsdóttir



THE IDEA:

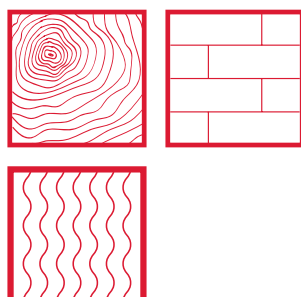
I would upcycle rock wool into roller blinds with two functions: to insulate when in use and as a fire blanket in case of fire.

DESCRIPTION OF SOLUTION:

The blinds are made from a thin layer of insulating rock wool. As rock wool is naturally fire resistant, the blinds also serve as a fire blanket. The length of the blinds would be controlled with an operating chain. They would be relatively loosely stuck on the spinning wheel, possibly with Velcro, so if the blinds were pulled at a certain force, they would be released from the wheel to be used as fire blanket.

RESULT:

Aside from fire safety, these roller blinds prevent heat loss; conserve energy and ensure a reduced carbon footprint. Hopefully, this idea will encourage the public to bring waste rock wool to recycling stations.



“It’s really about starting a sustainable conversion of the construction sector as fast as possible. At Enemærke & Petersen we focus on creating immediate results – even if small. We will use these results to fuel the necessary large scale change.”

Lars Jess Hansen, COO, Enemærke & Petersen a/s



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Petersen a/s**



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