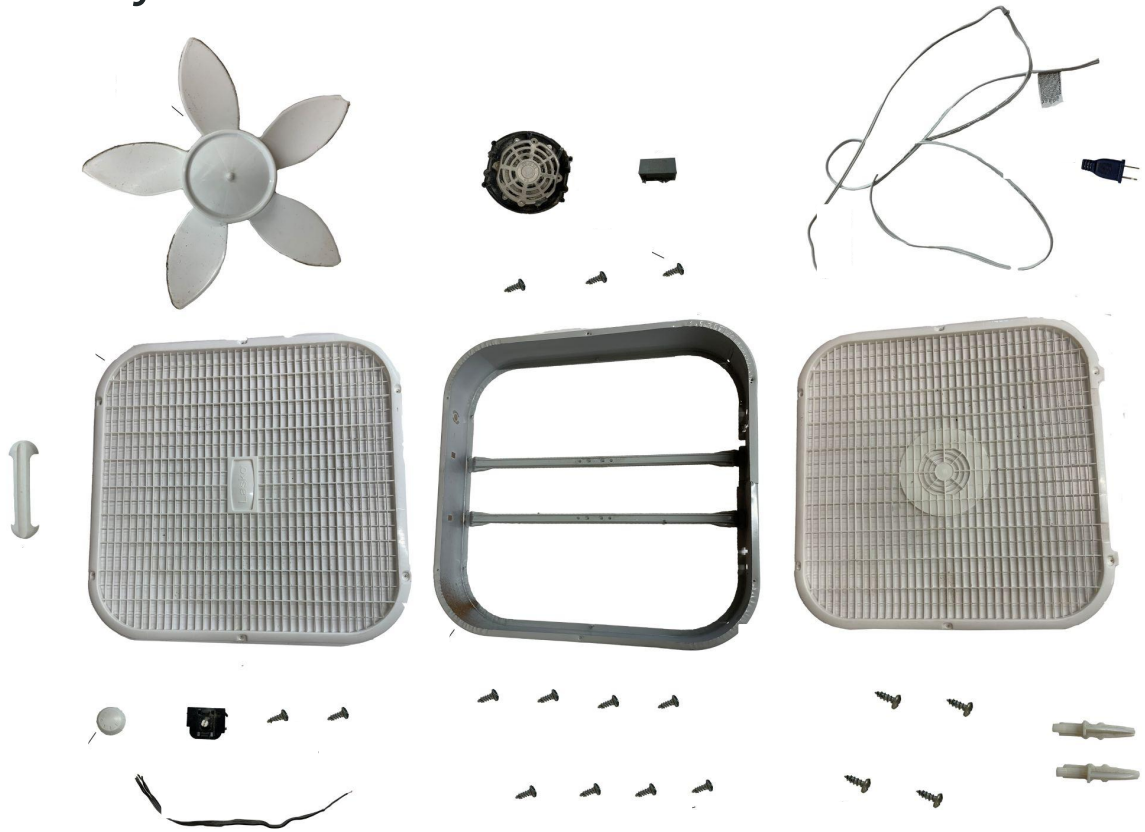
SolFan

Box Fan LCA/Redesign

Jess Thies and Evan Sievers

Product Disassembly



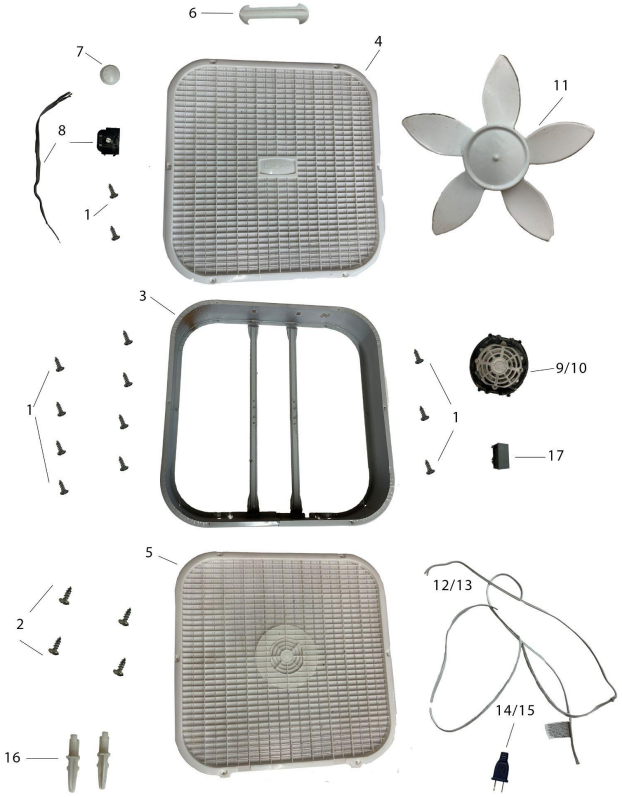
Lasko Cool Colors 20" Box Fan with 3-Speeds, B20200, White

★★★★☆ (4.2) 5489 reviews

Now $22.46 ~~$24.96~~ ⓘ

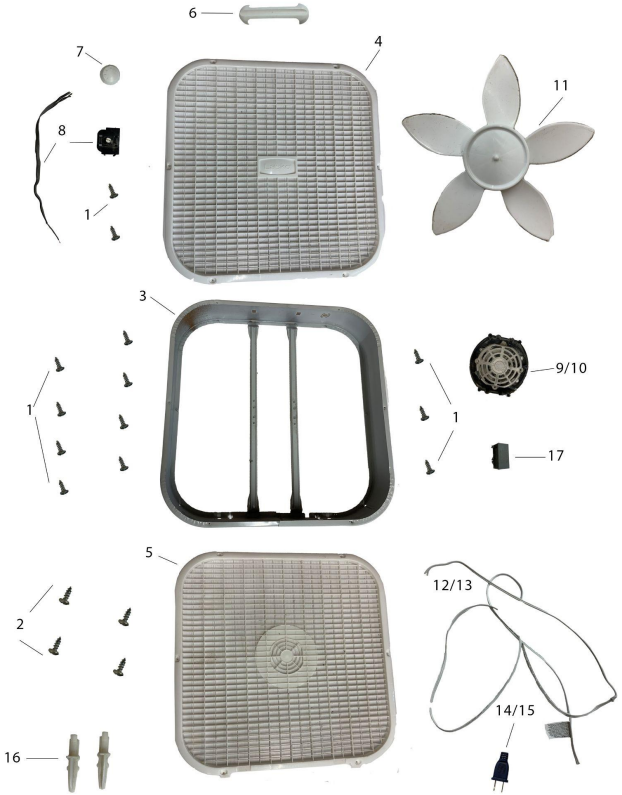
Bill of Materials

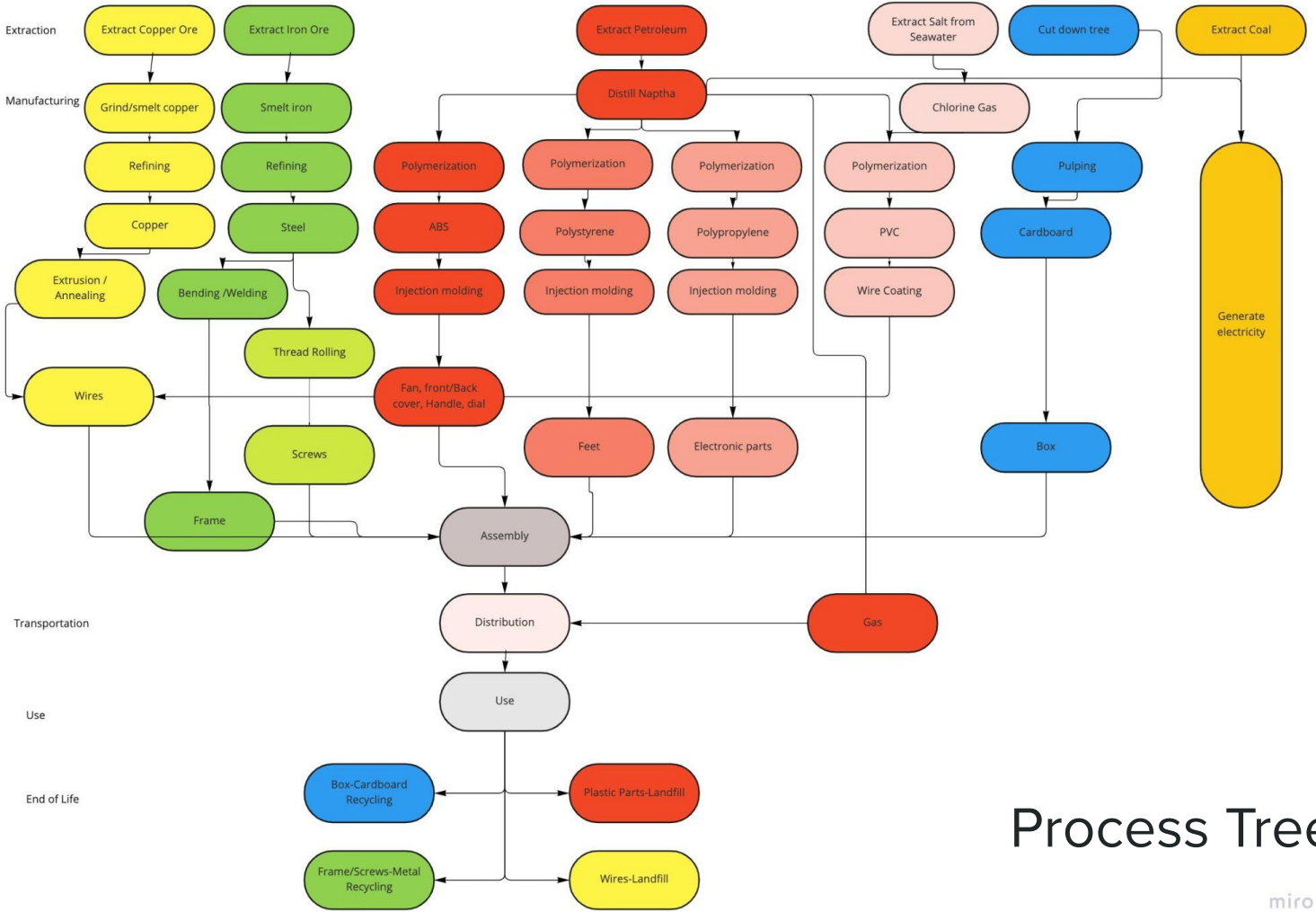
Part Number	Part Name	Quantity	Material	Weight (g)
1	Small Screws	13	Steel	1
2	Large Screws	4	Steel	2
3	Metal Frame	1	Steel	1140
4	Front Cover	1	ABS	263
5	Back Cover	1	ABS	273
6	Handle	1	ABS	27
7	Dial	1	ABS	6
8	Dial Motor	1	Polypropylene	11
9	Fan Motor	1	Copper and Steel	587



Bill of Materials Continued

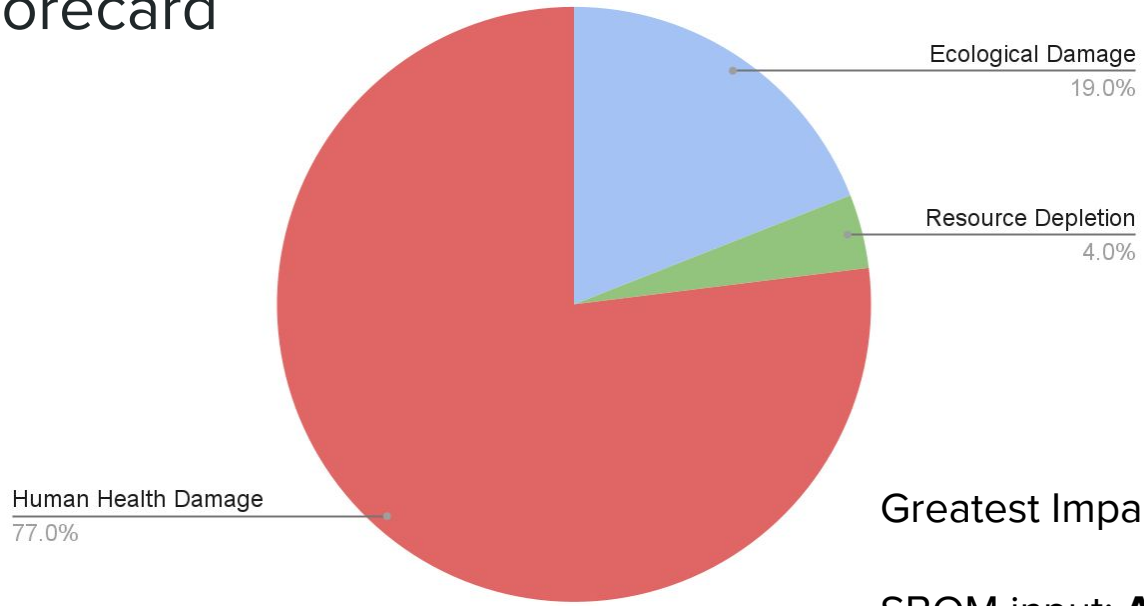
Part Number	Part Name	Quantity	Material	Weight (g)
10	Fan Motor Cover	1	Polypropylene	100
11	Fan	1	ABS	200
12	Wires	1	Copper	40
13	Wire Insulation	1	PVC	55
14	Plug Insulation	1	PVC	15
15	Wall Plug	1	PVC and Steel	4
16	Feet	2	High-Impact Polystyrene	10
17	Small Box8 Microfarad	1	Polypropylene	33





Process Tree

Sustainable Minds Scorecard



Impact per functional unit: **2.2 mPts per 1 year of use**

Total amount of service delivered: **8 x 1 year of use**

Impacts of total service delivered: **18 mPts**

Greatest Impacts:

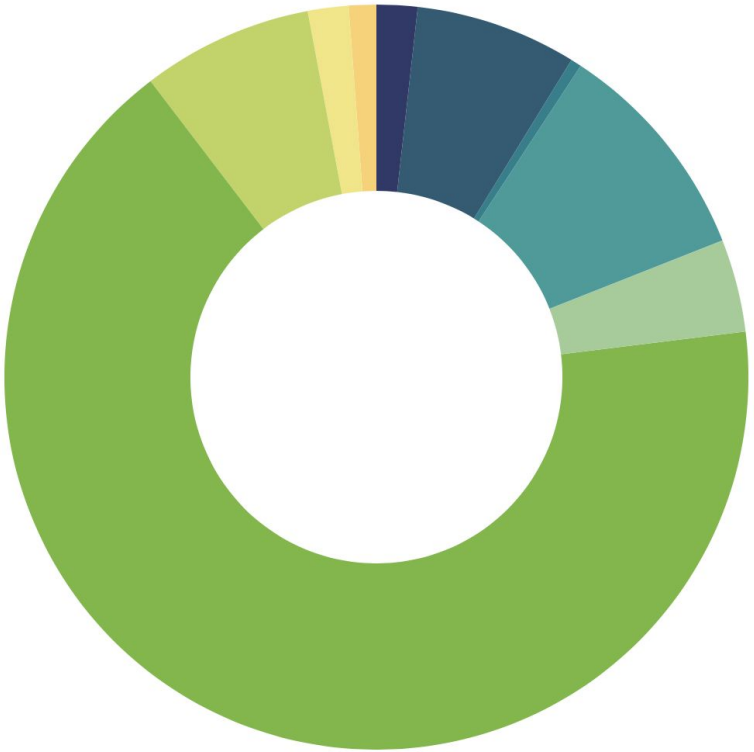
SBOM input: **Austenitic stainless steel**

Impact category: **Carcinogenics**

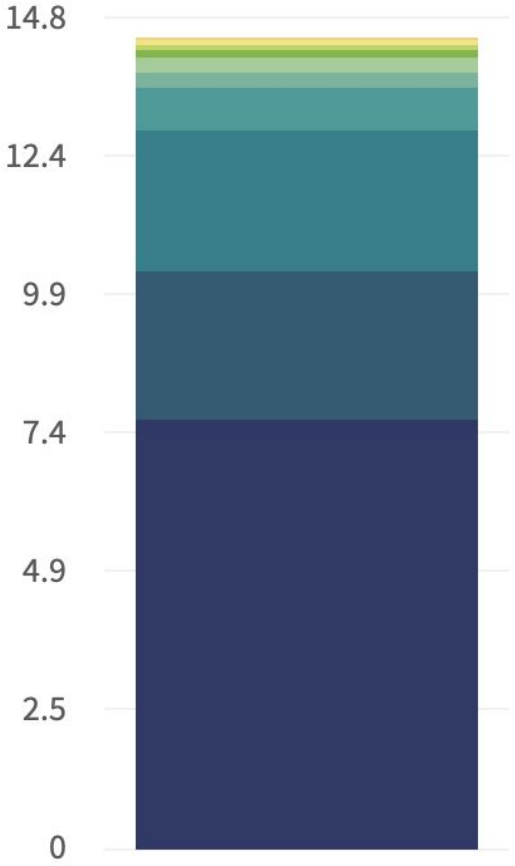
Life cycle stage: **Manufacturing**

Scorecard Details

Impact category	%
Ecological damage	
Acidification	1.78
Ecotoxicity	7.01
Eutrophication	0.47
Global warming	9.76
Ozone depletion	0.01
Resource depletion	
Fossil fuel depletion	4.01
Human health damage	
Carcinogenics	66.57
Non carcinogenics	7.43
Respiratory effects	1.77
Smog	1.19



Carbon Footprint

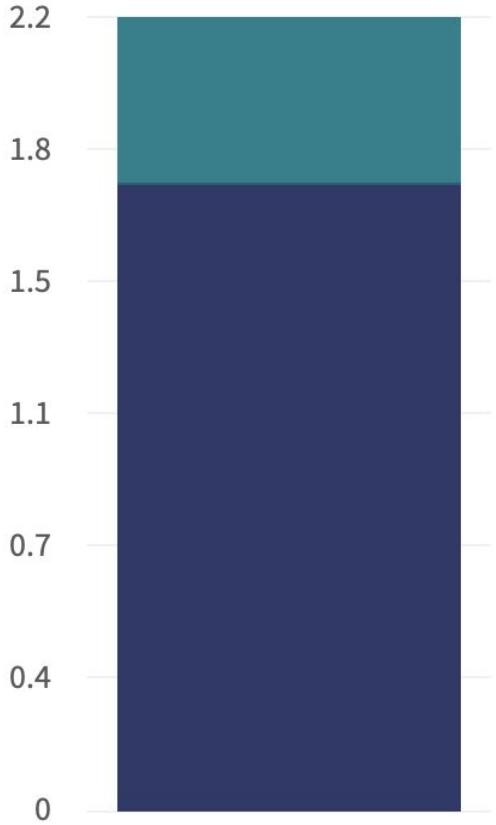


Total Emissions: 15 CO2 eq. kg/func unit

Input	CO_2 eq. kg/func unit
Electricity, 120 V, US	7.68
Injection molding, plastics	2.63
Electronics for control units	2.53
Stainless steel, austenitic	0.780
Capacitor, electrolyte type, > 2cm height	0.255
Stainless steel, austenitic	0.244
Acrylonitrile-butadiene-styrene copolymer, ABS	0.132
Acrylonitrile-butadiene-styrene copolymer, ABS	0.127
Injection molding, plastics	0.0585
Injection molding, plastics	0.0564

Lifecycle stage	CO_2 eq. kg/func unit
Manufacturing	7.12
End of life	0.0279
Use	7.68

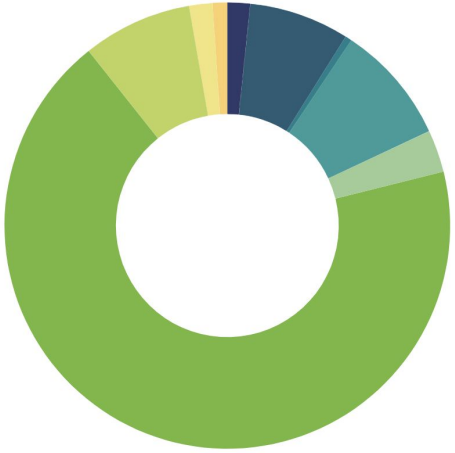
Impact by Life Cycle Stage



TOTAL: 2.2mPts/func unit

Lifecycle stage	mPts/func unit
Manufacturing	1.73
End of life	7.84×10^{-3}
Use	0.454

Material and Manufacturing Improvements



Impact category	%
Ecological damage	
Acidification	1.65
Ecotoxicity	7.27
Eutrophication	0.48
Global warming	8.65
Ozone depletion	0.01
Resource depletion	
Fossil fuel depletion	3.07
Human health damage	
Carcinogenics	68.19
Non carcinogenics	7.94
Respiratory effects	1.69
Smog	1.07

1st Try with Recycled Metals

Total Emissions: 13 CO_2 eq. kg/func unit

4.5% performance improvement, slightly reduced global warming impact, surprise at increase in carcinogenics, not large enough change from original design

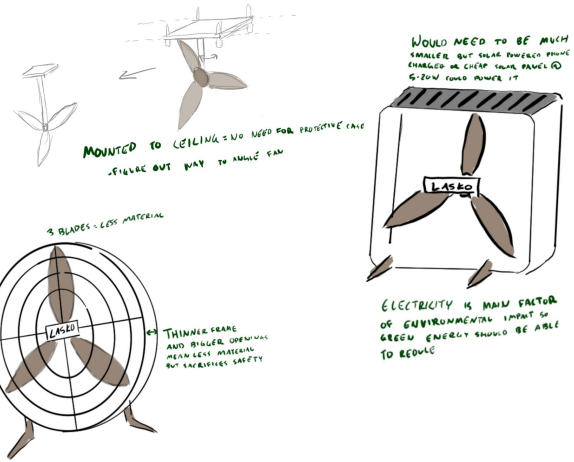
Impact per functional unit: **2.1 mPts per 1 year of use**

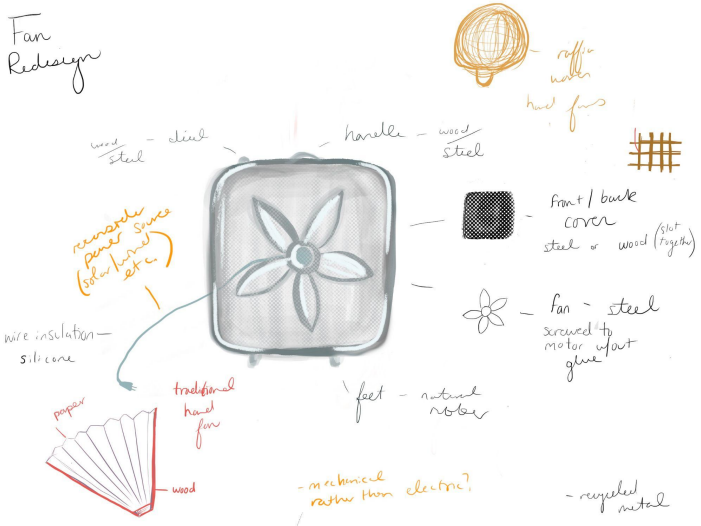
Total amount of service delivered: **8 x 1 year of use**

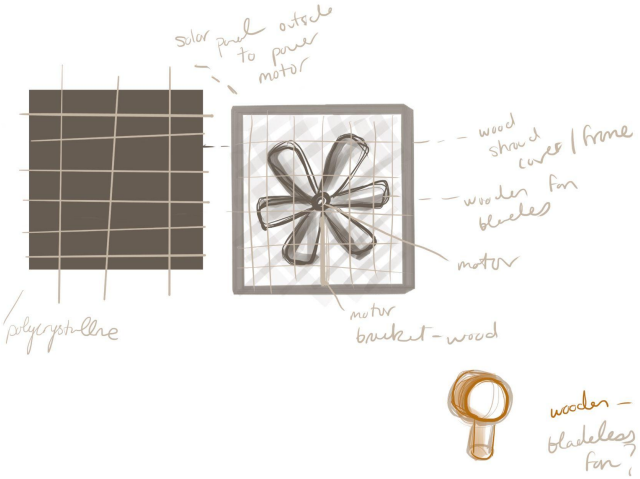
Impacts of total service delivered: **17 mPts**

Redesign Sketches/Ideas

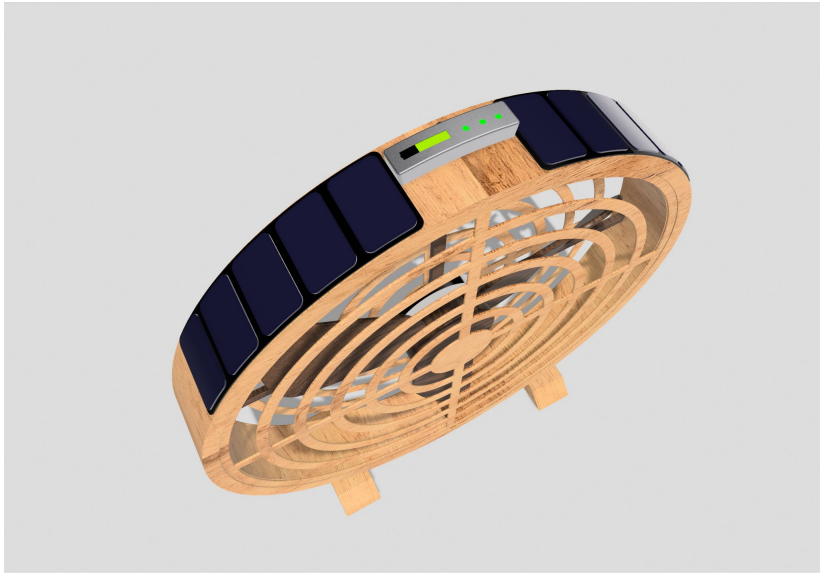
-Looking at traditional (hand) fans & bladeless/ ceiling wooden fans
-Renewable Energy
-Mechanical rather than Electric
-Design for disassembly
-Form redesign to use less materials
-Use less materials

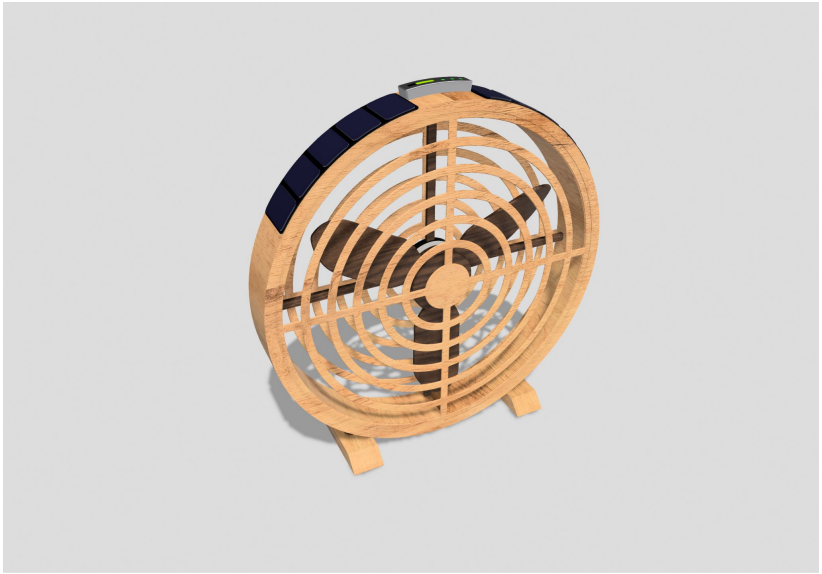




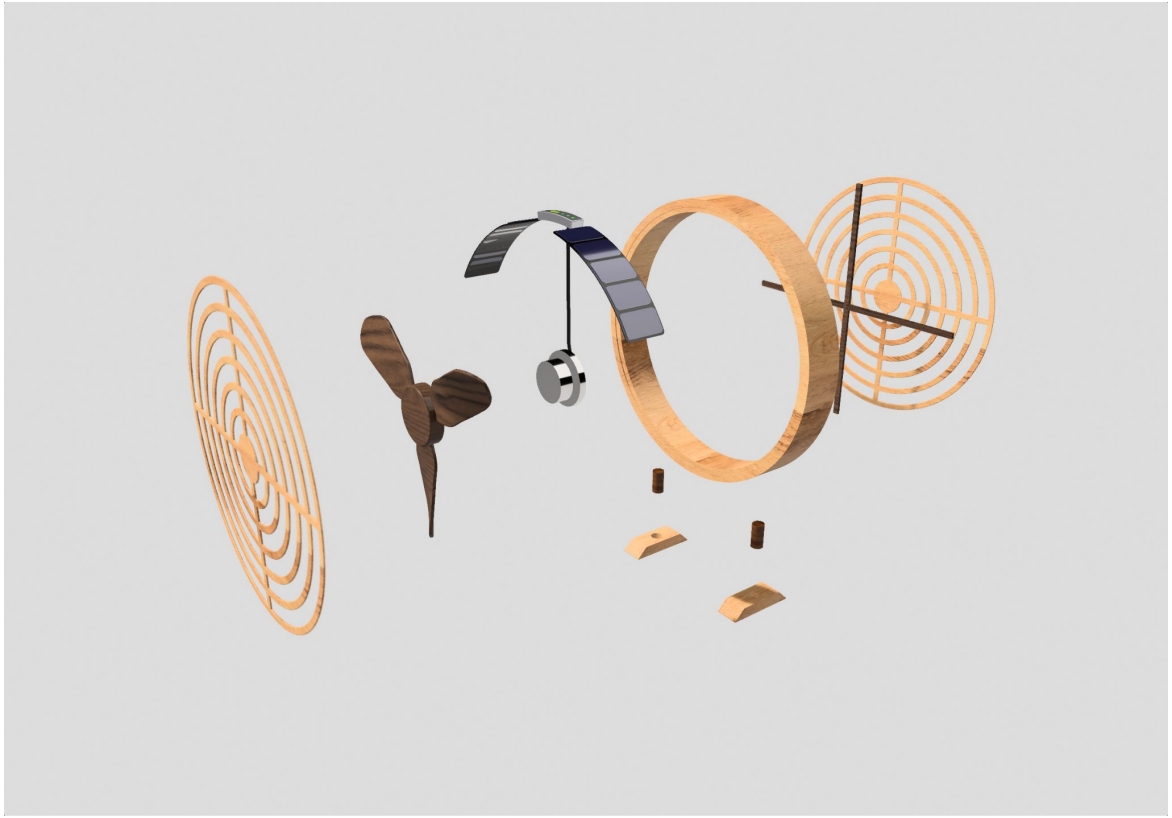


3D Rendering/ Exploded View with New Design





Exploded View



Redesigned to:

- Use Less Materials (3 Blades over 5, less material for the case)
- Snap-fit covers replace screws (less disassembly needed to recycle)
- Redesigned Casing to be able to more easily disassemble to repair
- Runs on Solar Power
- Part of larger Service System
- Increases lifespan of product
- Company will recycle parts for new products

Material and Manufacturing Improvements

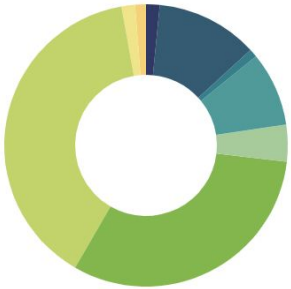
Updated Concepts with Wood /Solar Power

Total Emissions: 4.9 CO2 eq. kg/func unit

SBOM input: **Electronics for control units**
Impact category: **Non- carcinogenics**
Life cycle stage: **Manufacturing**

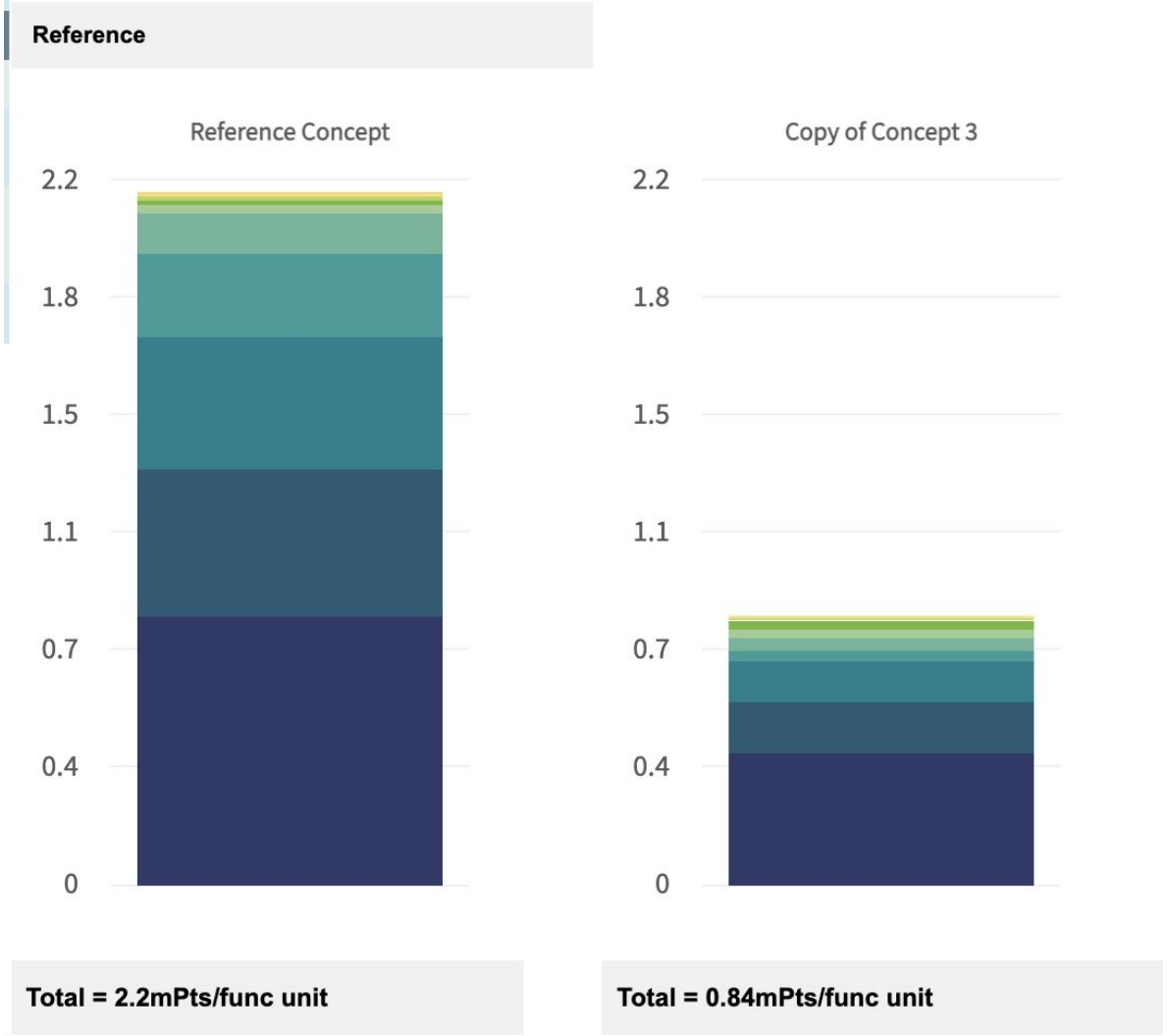
Impact per functional unit: **0.84 mPts per 1 year of use**
Total amount of service delivered: **8 x 1 year of use**
Impacts of total service delivered: **6.7 mPts**

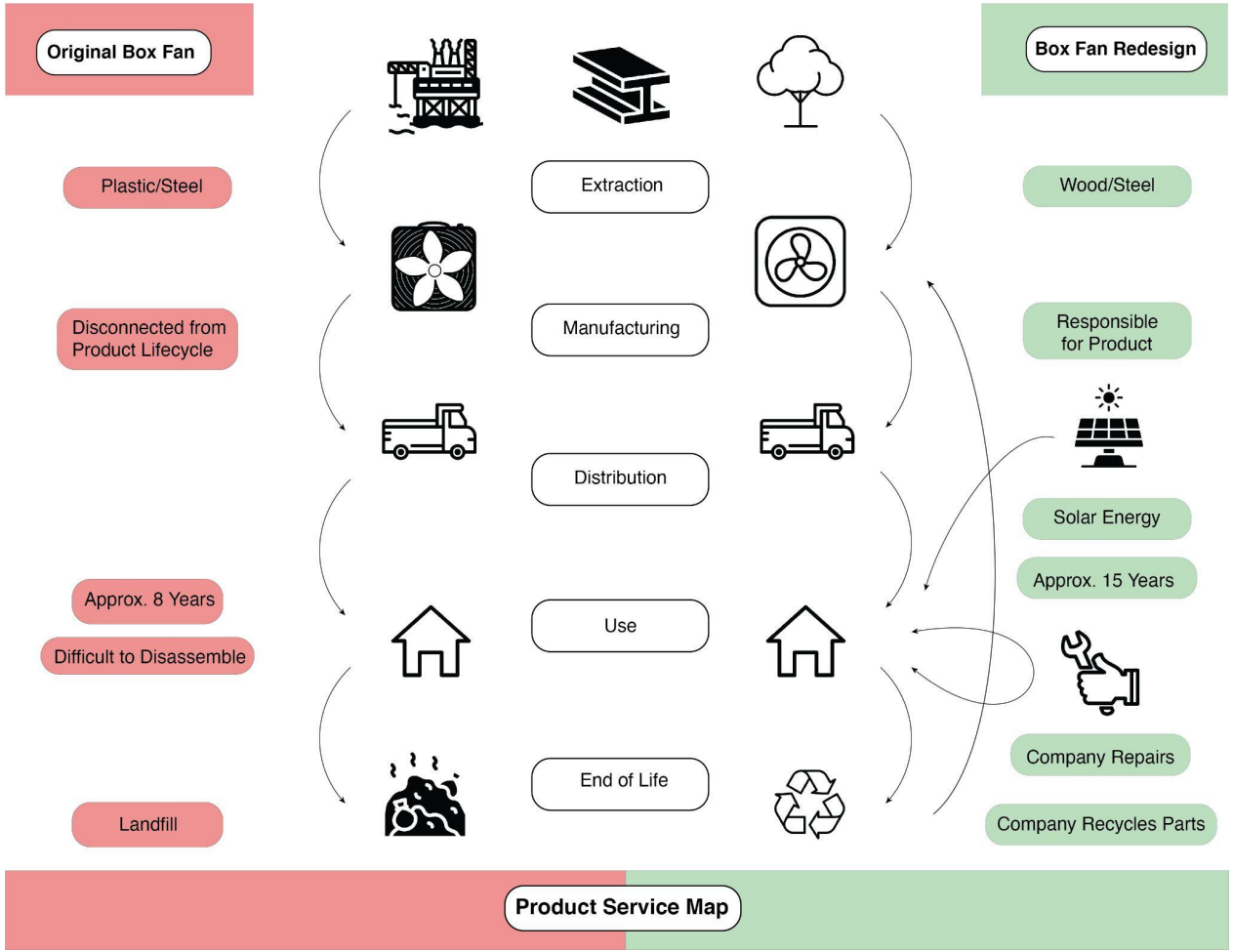
Electronics for control units
Non carcinogenics
Manufacturing



Impact category	%
Ecological damage	
Acidification	1.55
Ecotoxicity	11.63
Eutrophication	0.95
Global warming	8.5
Ozone depletion	0.01
Resource depletion	
Fossil fuel depletion	4.21
Human health damage	
Carcinogenics	31.47
Non carcinogenics	38.91
Respiratory effects	1.53
Smog	1.24

62% performance improvement




Original Box Fan
Box Fan Redesign
Plastic/Steel
Extraction
Wood/Steel
Disconnected from Product Lifecycle
Manufacturing
Responsible for Product
Distribution
Solar Energy
Approx. 8 Years
Approx. 15 Years
Difficult to Disassemble
Use
Company Repairs
End of Life
Landfill
Company Recycles Parts
Product Service Map

Evaluation

Change power source, instead of electric- use solar/green energy

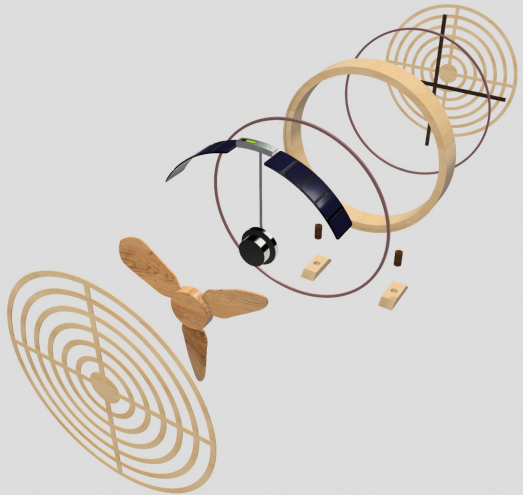
Reduce # of materials and amount of materials

Replace plastic parts with renewable/natural materials

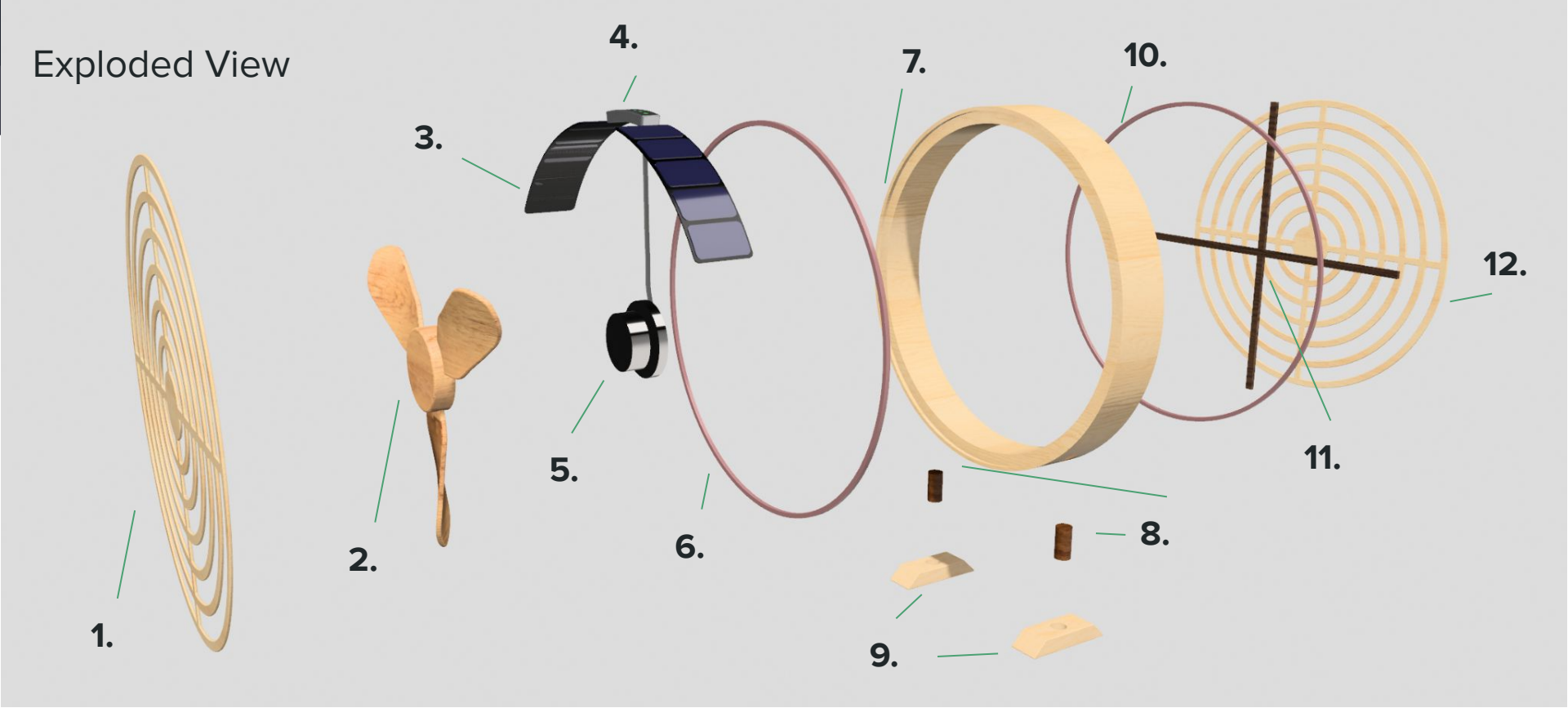
Disassemble / recycle

Establish systems for repair/recycling

SolFan



Exploded View



1. Front Cover
2. Fan Blade
3. Solar Panels
4. Battery/Control Panel
5. Motor
6. Natural Rubber Ring
7. Frame
8. Legs
9. Feet
10. Natural Rubber Ring
11. Motor Support
12. Back Cover

Original Box Fan

Extraction

Plastic/Steel

Manufacturing

Disconnected from Product Lifecycle

Distribution

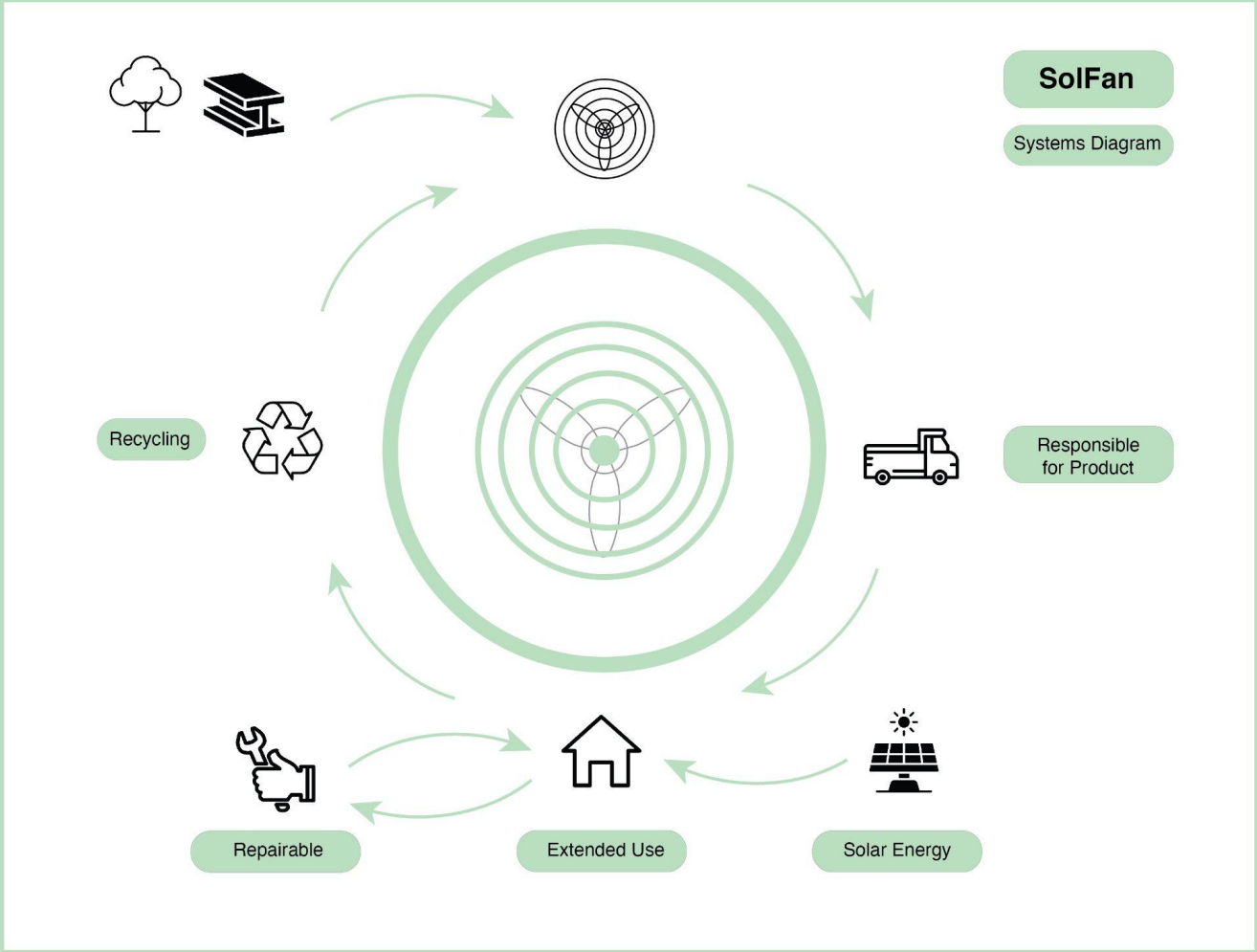
Use

Approx. 8 Years

Difficult to Disassemble

End of Life

Landfill



SolFan owns their products. Users pay them a service fee for use.

The company is responsible for the entire lifecycle including at home repairs, which help to extend the product lifecycle.

Their products are solar powered, and use less raw materials. At the end of use, the company is recycles the parts to manufacture new products.