



Establish an Aerospace-Grade Carbon Fiber Recycling Program in the United States

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Overview



Proposed Change

- Currently, Boeing partners with UK-based ELG Carbon Fibre for recycling of its excess aerospace-grade carbon fiber
- We recommend establishing a 4-year recycling partnership with Colorado-based Mallinda once the ELG contract expires

Carbon Reductions

- Year 1 carbon dioxide emissions reductions of ~650k pounds
- Total carbon dioxide emissions reductions of ~2.7M pounds
- Decreased transport distance to the recycler will reduce transportation needs, leading to lower trucking and shipping emissions

Cost Savings

- Year 1 cost savings of ~\$540k
- Total cost savings of ~\$2.3M
- Eliminating maritime transport of and reducing trucking transport of the recyclable carbon fiber will lower transportation costs and leverage economies of scale

Background & Motivation



Background

- Founded in 1916, Boeing is one of the world's largest aerospace manufacturers, producing a variety of aerospace products
- By dollar value, Boeing is the largest exporter in the US, and the company employs over 140k employees globally
- With innovation and engineering excellence at the core of its work, Boeing champions sustainability in its operations and is actively seeking more efficient operational strategies

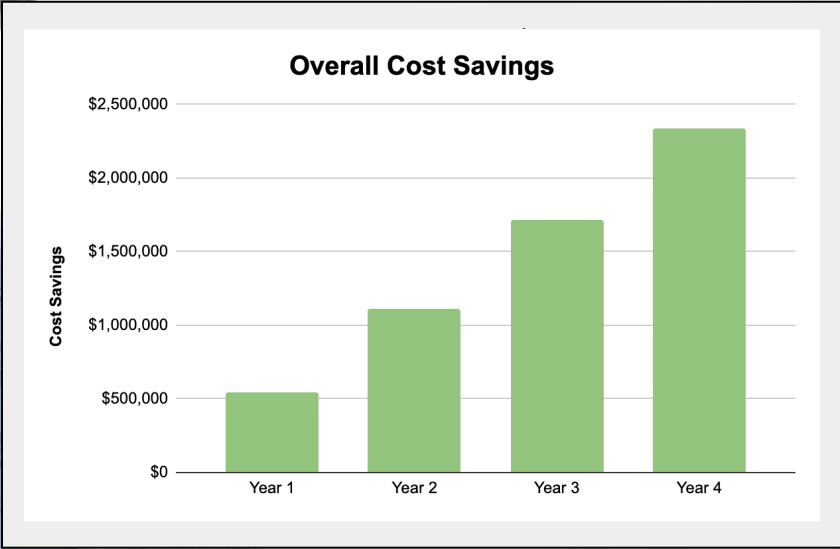
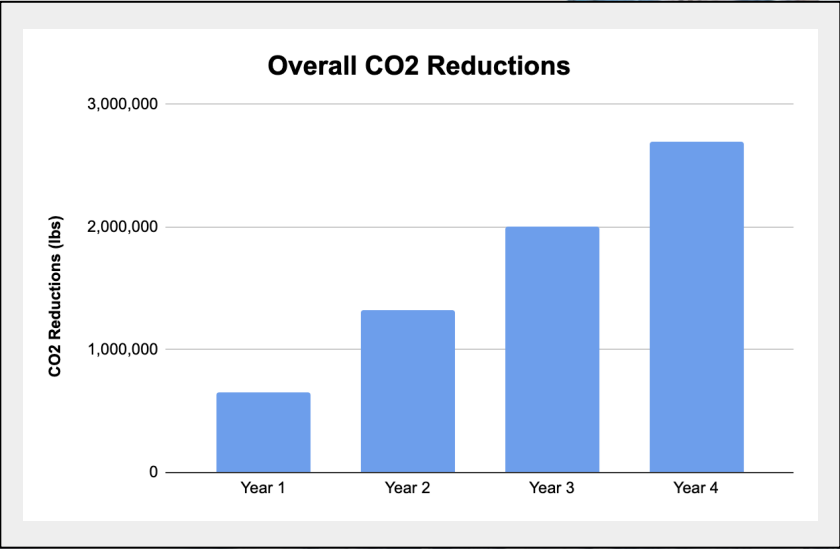
Motivation

- By partnering with Mallinda for carbon fiber recycling, Boeing can...
 - Reduce ~2.7M pounds of CO2 emissions in total and save ~\$2.3M in total
 - Better research long term solutions for carbon fiber waste reduction and in-house recycling
 - Prompt other co-benefits discussed later
- Implementation of our proposed change will continue to foster Boeing's sustainability and innovation mindset while improving operational efficiency

Carbon Reductions & Cost Savings

Carbon Reductions

Cost Savings



Co-Benefits

Simplifying Logistics

- Fewer and less complex logistics
- Reduction of trucking transport and removal of maritime transport
- Beneficial to simplify wherever possible for a company with as many moving parts as Boeing



Promoting US Economic Growth

- Will have positive ripple effect on US economy
- Increase likelihood of their recycled carbon fiber being used to produce quality goods for domestic market
- Support creation of American jobs



Improving Boeing's Public Image

- Boeing must convey its true values to recover from recent tainting of its reputation
- The carbon reductions described will support ongoing sustainability initiatives and mindset



Compounding Carbon Reductions

- Transport trucks could pick up supplier parts (or other needed goods) on drive back
- Eliminate the need for extra back-and-forth trucking trip, thus furthering CO2 emissions reductions



Anticipated Obstacles & Next Steps



Obstacles

- Size and bureaucracy at Boeing
- Ability of Mallinda to recycle such large volumes of carbon fiber
- The transition from existing recycling partnership with ELG
- Proprietary information

Obstacle Risk Mitigation

- Early buy-in from relevant management at Boeing
- Overestimations of volume in early negotiations; operational support
- Emphasis on carbon reductions over financial savings when pitching to management
- Proprietary info will not be an issue if Boeing chooses to pursue the initiative further

Next Steps

- Operational support to Mallinda
- Adjust based on further materials innovations in aerospace industry
- Monitor data related to goods sold that are made from recycled carbon fiber
- Optimize coordination of trucking



Questions?