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### **BAYERISCHE MOTOREN WERKE AG (B)**

As Franze and Wolf considered BMW's options, they knew that any evaluation of a vehicle take-back and secondary materials strategy had to incorporate an assessment of that strategy's economic impact. This was particularly important for two of the options under consideration for the management of secondary materials; both the decision to use recycled polymers in BMW vehicles and the decision to incorporate design for environment (DFE) methodologies into the overall design process called for the use of recycled polymers instead of virgin plastics. Franze and Wolf needed to determine the economic viability of such a substitution.

To estimate the cost to BMW of using recycled polymers in its vehicles, Franze suggested that they choose one automobile component for examination. They decided to focus upon the bumpers in BMW's new 3-series in order to determine materials flows and costs, recycling costs and recycling logistics.

It is assumed that a dismantler will take off bumpers from returned cars and send them to processors for cleaning and pelletizing. These processors will then return the material to the plastics suppliers for testing and reuse. Actors pay for and exact margin on transportation costs.

***Operational and Financial Data:***

Negotiated Disposal Price (Dismantler to Final Owner) of BMW: DM 500

Percentage Cost of Bumper of Negotiated Disposal Price: 0

3 series Bumper Weight: 9 kg

BMW's Price for Virgin Polycarbonate: 1.81 DM/kg

3 series Bumper Disassembly Time: 4 min

Labor Costs of Disassembly: 25 DM/hr

Labor Costs of Cleaning, Pelletizing Polymer Components: .45 DM/kg

Labor Costs of Testing Polymers: .7 DM/kg

Costs of Transportation and Logistics: 12.5 DM/tonne-km

Distance between Each Actor: 20 km

Dismantler Margin: 15%

Processor Margin: 15%

Plastics Supplier Margin: 25%

***Assignment:***

1. Calculate the cost to BMW of recycled polycarbonate per kilogram in the 3-series bumpers.
2. Calculate the cost to BMW of virgin polycarbonate per kilogram in the 3-series bumpers.