Lecture #20

ERDM

Vishesh Kumar

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Overview of this Lecture

Automotive Life-Cycle

Motivation

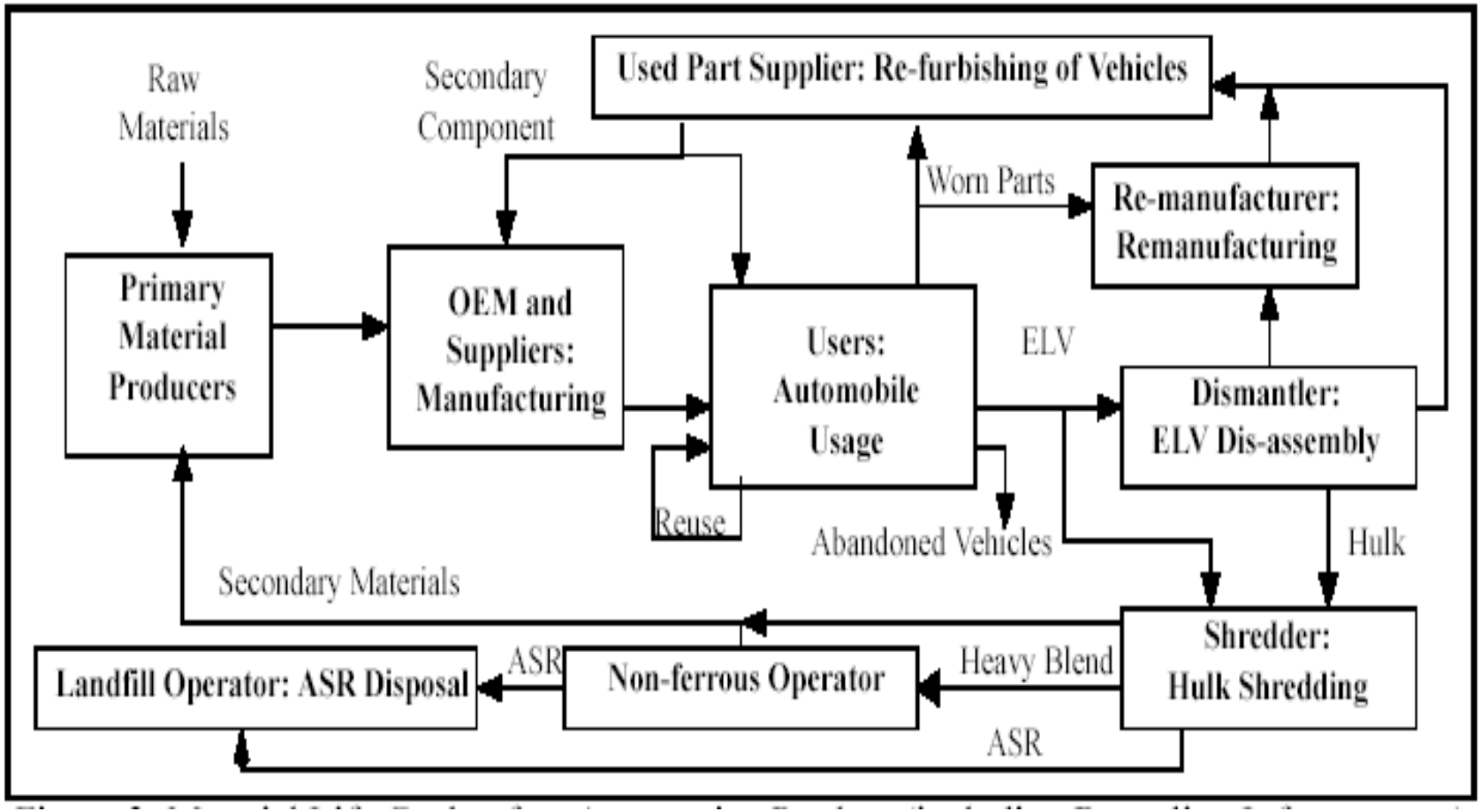
End-of-Life Directive

Present Recycling Infrastructure in US

Economics

My Research

Automotive Life-Cycle



Why Study Automotive Recycling?

Automobile waste is a very small fraction of municipal solid waste

95% of the vehicle enter the recycling phase. 75% of the material content is recycled.

Manufacturers have focused on reducing the used phase emissions.

Regulation on the Vehicle End-of-Life in Europe.

Why only automobiles?

High Volume Product

- **Over 735 million vehicles registered in the year 2000 with over 215 million in US only [Wards, 2002]**

One of the most polluting products

- **Much attention was given to reduce the tail pipe emissions leading to increase in pollution after the use life of the vehicle**

Highly Visible product

End-of-Life Vehicle Directive

85% recycling by the year 2006
80% recycling and no more than 5% energy recovery
95% recycling by the year 2015
85% recycling and no more that 10% energy recovery
Extended Producers Responsibility ---- Take-Back Regulation

Why is this a concern for the manufacturers in US?

Global presence
Future regulations ---- Proactive approach

Recycling Infrastructure in US

Stakeholders

- **Dismantler**
- **Shredder**
- **Non-Ferrous Separator**

Dismantler

- **Purchase vehicles from the last user ---- Cost?**
- **Removes all the useful component**
- **Forced to remove other things like radiator, fuel tank, fluids, battery ---- Why?**

Shredder

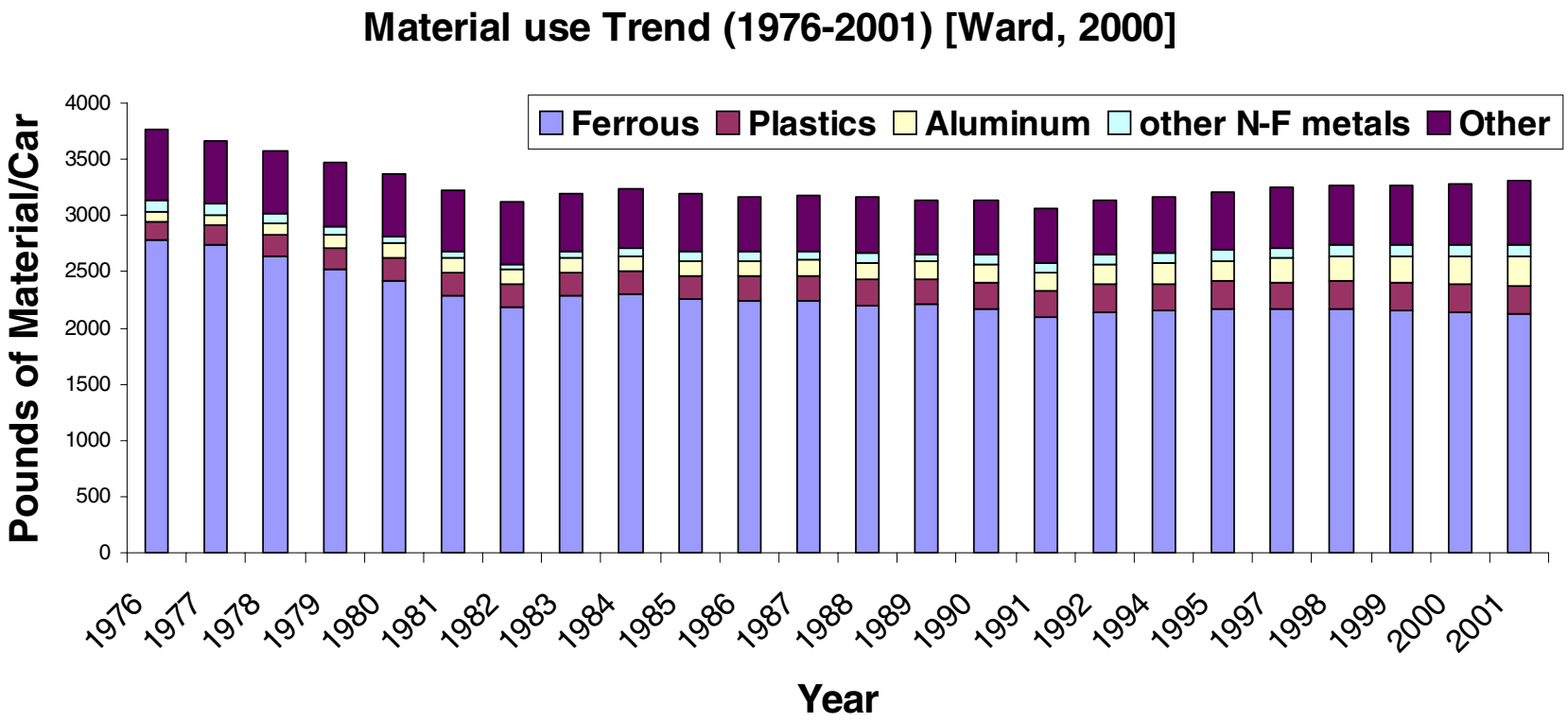
- **Shreds the hulk into fist size pieces**
- **Separates material into different categories like ferrous, non-ferrous**
- **Whatever material is left (or ASR -- Automotive Shredder Residue) is generally landfilled ---- though energy recovery is one of the options.**

Non-Ferrous Separator

- **Separates non-ferrous materials like copper, aluminum**
- **Rest is landfilled.**

This recycling infrastructure is economically feasible for vehicles that have high ferrous content

What is different now?



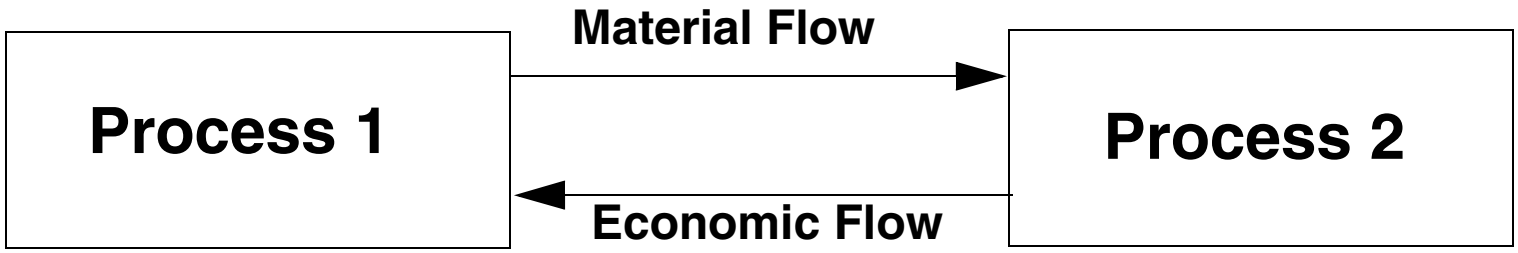
More plastic, aluminum, and other non ferrous material in the vehicle.

What is the problem with increase in these materials?

- **Recycling technology for plastics does not exist.**
- **Market for recycled material may not exist**
- **Contamination may be a problem**
- **Economies of scale may create a problem**

So the stakeholders in the recycling infrastructure may not be willing to do business if there is no profit.

Economics



Same is the case in automotive recycling infrastructure, except for landfill where the shredder or non-ferrous separator has to pay for landfill

Thus if ASR content increases in the recycling process then the shredder and/or non-ferrous separator may loose money

My Research

Study the effects of material and technological change in view of the ELV regulation.

Study both the environmental and economic impact on the recycling infrastructure.

Methodology

Simulate the infrastructure with the help of historical data

Develop future scenarios

Run simulations based on these new scenarios