世界環境のための平和を求める仕事のため

The Takeda Award 2001

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation
The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation
The Limits to Growth

Beyond the Limits

The Takeda Award 2001

World Environmental Well-Being
The Takeda Award 2001

World Environmental Well-Being
The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Being

The Takeda Foundation

The Takeda Award 2001

World Environmental Well-Be
The development and promotion of the Ecological Rucksacks and Material Input per Unit Service (MIPS) concepts, as measures of the ecological stress of products and services.

Figure 1: Ecological rucksacks (light color squares) of various base materials for world wide usage in 1983 (deep color squares)

Source: Lütting/Walter/Merian/IEA Coal Research/US-DOE/Rucksacks: Schuty, Liedtke
The development and promotion of the Ecological Rucksacks and Material Input per Unit Service (MIPS) concepts, as measures of the ecological stress of products and services.

**Figure 2** Example of ecological rucksack of automobile.

\[ \sum (M_i \cdot R_i) = M_I \]

- **Material (e.g. Steel, glass)**
- **Material intensity of base material (rucksack)**
- **Total material input**

\[(M_1 \cdot R_1)\]
\[+ (M_2 \cdot R_2)\]
\[+ (M_3 \cdot R_3)\]
\[+ (M_z \cdot R_z)\]

- **e.g. steel plus rucksack**
- **e.g. glass plus rucksack**
- **e.g. plastics plus rucksack**

Ecological rucksack of an automobile is the sum of all ecological rucksacks of materials used.

\[ M_I = M_1 \cdot R_1 + M_2 \cdot R_2 + M_3 \cdot R_3 + M_4 \cdot R_4 + \cdots + M_i \cdot R_i \]

*Used materials: steel(M1), glass(M2), plastics(M3), ceramics(M4), platinum(M5),…*

When about 3g of platinum are used in the catalytic converter in an automobile in addition high-quality steels, ceramics and other materials.

**Ri of platinum (rucksack factor) = about 350,000**

Ecological rucksack of 1g platinum is 350kg.

**Ecological rucksack of 3g platinum (in kg)**

\[ M_I = 0.003 \times 350,000 = 1050 \]

Ecological rucksack of the catalytic converter almost equals the weight of an automobile itself.
The development and promotion of the Ecological Rucksacks and Material Input per Unit Service (MIPS) concepts, as measures of the ecological stress of products and services.

**Figure 3.** The MIPS trajectory with increasing numbers of extracted utility units (service units), in the case of a washing machine.

The MIPS trajectory with increasing numbers of extracted service units, such as with a washing machine. In this case, though, a small repair requiring resource inputs (energy, materials, transportation etc.) was performed at point X, increasing the relative ecological rucksack of the project. At point Y, a much more substantial repair became necessary. This repair leads to an ecologically absurd result and also would most likely be a bad investment of money.