The End of Paradox?

Stop Looking in the Wrong Place for Achieving Sustainability

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What are the most efficient cars to drive today?

Why Is Fuel Economy So Important?
When comparing cars with different fuel economies, it’s important understand that the car with the better fuel economy will use less fuel to cover the same distance which will therefore have a lower impact on your wallet and the environment. This is why cars with good fuel economy are often referred to as ‘green’ vehicles or environmentally friendly models. Not only will you be saving money at the petrol pump each week, you’ll also be reducing your greenhouse gas emissions and carbon footprint.

www.comparethemarket.com.au
What are the most efficient cars to drive today?

The Australian government's Green Vehicle Guide provides some answers:

1. BMW i3 - annual fuel costs of $541.
2. Mitsubishi iMiEV – ($567 per year).
3. Renault Kangoo ZE ($651 per year).
increasing energy efficiency = increasing productivity of energy

↓

reducing its implicit price,
because you get more return for the same money
increasing energy efficiency = increasing productivity of energy

↓

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increasing demand
i. Increased efficiency makes the use of energy relatively cheaper, thus encouraging increased use.

ii. Increased efficiency leads to increased economic growth, which pulls up energy use in the whole economy.

iii. Increased efficiency in any one bottleneck resource multiplies the use of all the companion technologies, products and services that were being restrained by it.
The Coal Question
(William Jevons, 1856)

Watt steam engine

Increased efficiency of the coal-fired steam engine

can became a more cost-effective power source

increased use of the steam engine in a wide range of industries

increased total coal consumption, even as the amount of coal required for any particular application fell
The Coal Question
(William Jevons, 1856)

“It is a confusion of ideas to suppose that the economical use of fuel is equivalent to diminished consumption. The very contrary is the truth.”

The Jevons paradox:
the economical use of fuel results not in diminished consumption but in an over-all increase.
1993-2005

Improved energy efficiency of residential air-conditioning equipment

28%

Energy consumption for A.C. by the average air-conditioned household rose

37%
Modern Analysis of Jevons Paradox

- Rebound
- Backfire
- Khazzoom–Brookes
- Downs–Thomson
- Pigou–Knight–Downs
- Lewis–Mogridge

Paradox
Food demand etc. → Irrigated crop lands → Irrigation water demand → Groundwater withdrawals → Increase depletion of groundwater resources
SAVE WATER
SAVE LIFE AND THE WORLD
Cathy Durden
Efficient Irrigation Technology

Does it lead to reduced groundwater extraction?
widespread conversion from traditional center pivot irrigation systems to higher efficiency dropped-nozzle center pivot systems
Status Quo

Food demand etc. \rightarrow \text{Irrigated crop lands} \rightarrow \text{Irrigation water demand} \rightarrow \text{Groundwater withdrawals} \rightarrow \text{Increase depletion of groundwater resources}

State and national cost-share programs \textbf{subsidies} for higher irrigation efficiency \rightarrow \text{Irrigation \textit{efficiency improvements}} \rightarrow \text{Higher revenue / lower costs} \rightarrow \text{Shift to water intensive crop mix}

More frequent & extensive use of irrigation

Western Kansas, US
Pfeiffer (2013)
savings of increased resource efficiency can be viewed as

New Resource
Water Transfer Projects

Demand Management

Real Water Deficit

Water Transfer Projects
Generates symptoms that demand attention

Difficult for people to address

It is obscure or costly to confront

Solutions:
well-intentioned, fixes which seem extremely efficient

They leave the underlying problem unaltered

It is unsustainable: The underlying problem grows worse
Resource Stress Index

\[ RSI_{B_{11} & B_{12}} = \frac{\text{water demand} \ (\text{MCM}/\text{Year})}{\text{Inter-basin} \ \text{Intra-basin water resources} \ (\text{MCM}/\text{Year})} \]

Transfer + Improving Efficiency

Overexploited

BAU

1990

2031
EPPP = \frac{\text{Annual real GDP produced in sector } i \text{ (Rials);}}{\text{Annual job opportunities which is generated in sector } i \text{ (Person)} \times \text{Annual water utilization in sector } i \text{ (MCM)}}
Paradox Of The Paradox

We simultaneously are aware of it and increasingly addict to it
Paradox Of The Paradox

Appealing Features

Improving efficiency is easy to endorse

The efficiency discussions at the policy tables are never contentious

No one is debating about who’s responsible, and there is no finger-pointing or playing the blame game

Advocating efficiency involves virtually no political risk
Politicizing The Paradox
political ecology of efficiency
From Paradox to Principle
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