

Linking Multiple Benefits to Energy Productivity: A Useful Proxy to Explore Macroeconomic Returns *

John A. “Skip” Laitner

*In Conversation with IEA Collaborators Exploring
the Multiple Benefits of Energy Efficiency*

Paris, France
March 7, 2018

* In the spirit and tradition of Nobel Laureate and former Caltech physicist Richard Feynman, in his 1959 visionary talk, “There’s Plenty of Room at the Bottom.” See, <http://www.its.caltech.edu/~feynman/plenty.html>.

**All models are wrong, but some
hopefully will become more
useful than others. . .**

**Or, what we might refer to as the
Laitner Variation on a well-known
modeling commentary by George Box**

Some Opening Thoughts

- There is clear evidence that the economy-wide returns on the “Second Industrial Revolution” technologies, and the larger public infrastructures, are diminishing.
- A social and economic transformation is clearly needed – driven by purposeful efforts that include fully funded programs, directed actions, and targeted investments.
- The interactive, productive, and more efficient use of all resources—capital, materials, and especially energy—must underpin this transformation.
- There is further a need to better understand/assess key social and economic trends to shape a policy-directed transition which also promotes environmental quality.

Perspectives Matter



Sonoran Agave Plant



South African Aloe Plant

At first glance, the similar structure of the Agave and the Aloe plants may lead us to think they are closely related. Yet, they are not. It isn't until we examine their flowers and their internal structures that we learn their closest common ancestor existed ~93 million years ago.

And so it is also with our understanding of energy resources. We think of energy as commodities sold on the market rather than energy as work.

Reviewing 3 Intermediate Perspectives

- 1) Tracking the incredible array of wastes that, unfortunately, are a vital part of our lives;
 - 2) Understanding energy as work; and
 - 3) Exploring total energy productivity.
- If we want to imagine a more robust and sustainable economy, we should help policymakers and business leader step back to first examine these perspectives in depth; and then act on all three together, at scale, and in China time. . .

(1) The Scale of Waste in the U.S.

- If we focus only on municipal solid waste, the U.S. generates about 2 kg of waste per capita each day.
- Yet, if we add to that waste, all the air pollution dumped each year, all of the carbon dioxide emissions, and the fecal matter from humans, cows and pigs, that waste grows to ~60 kg per person/day.
- Which does not include soil and water losses, mining tailings and many other forms of wastes.
- So the question, *are we living more by waste than ingenuity?*
- And can the productive use of resources more broadly drive what we now call multiple benefits? I think yes!

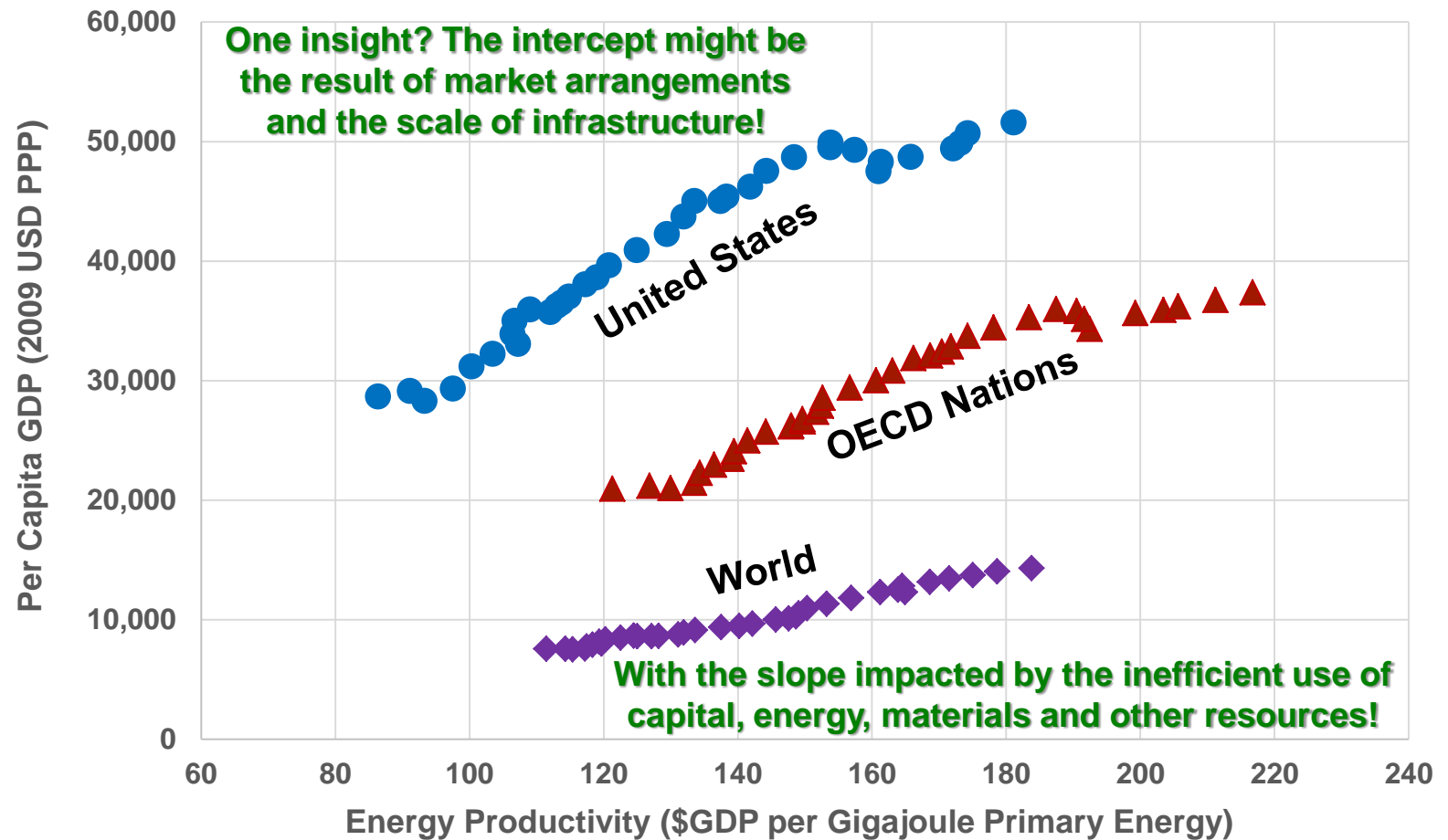
(2) The Different Views on Energy

- **Typical:** Energy as *commodities* that are sold on the market (e.g., barrels of oil or kilowatt-hours of electricity) – tracked by the various governmental agencies.
- **More Vital:** Energy as the capacity to do the useful *work* necessary to transform matter into the requisite goods and services for a local economy, and to distribute or make them available as required.
- **Result:** To ensure the appropriate development of innovation for sustainable economic activity, the *emphasis needs to be on energy as work—moving well past perhaps a 16% global (in)efficiency.*


(3) Key Energy Linkages Which Impact Overall Energy Productivity

- 1) Cost-effective ***energy efficiency improvements*** to reduce the level of end-use energy services necessary to deliver desired goods and other services.
 - 2) Renewables and other ***clean energy production*** to ease primary energy requirements, also cost-effectively, in the delivery of remaining energy needs.
 - 3) Shrinking the ***non-productive use of capital, materials, water, food and other resources*** to lessen energy demands even further.
- All 3 categories of productivity gains—energy efficiency, energy production, and waste reduction—can increase total energy productivity to the benefit of our social, economic and environmental well-being.

Link Between Energy Productivity and Per Capita GDP for Key Regions (1980-2015)



Source: Calculations by Skip Laitner using data from the International Energy Agency (2018).

An iceberg floating in the ocean. The tip of the iceberg, which is above the water line, is relatively small and jagged. The vast majority of the iceberg is submerged below the water line, appearing much larger and more complex in shape. Two vertical red bars are placed on either side of the iceberg, one on the left and one on the right, extending from the water line down to the bottom of the frame. The sky is blue with some light clouds, and the water is a deep blue.

Conventional assumptions
about the efficiency potential

Exploring the full
energy efficiency
potential: ~900 billion
barrels of oil equivalent
for the Global Economy
through the year 2050.

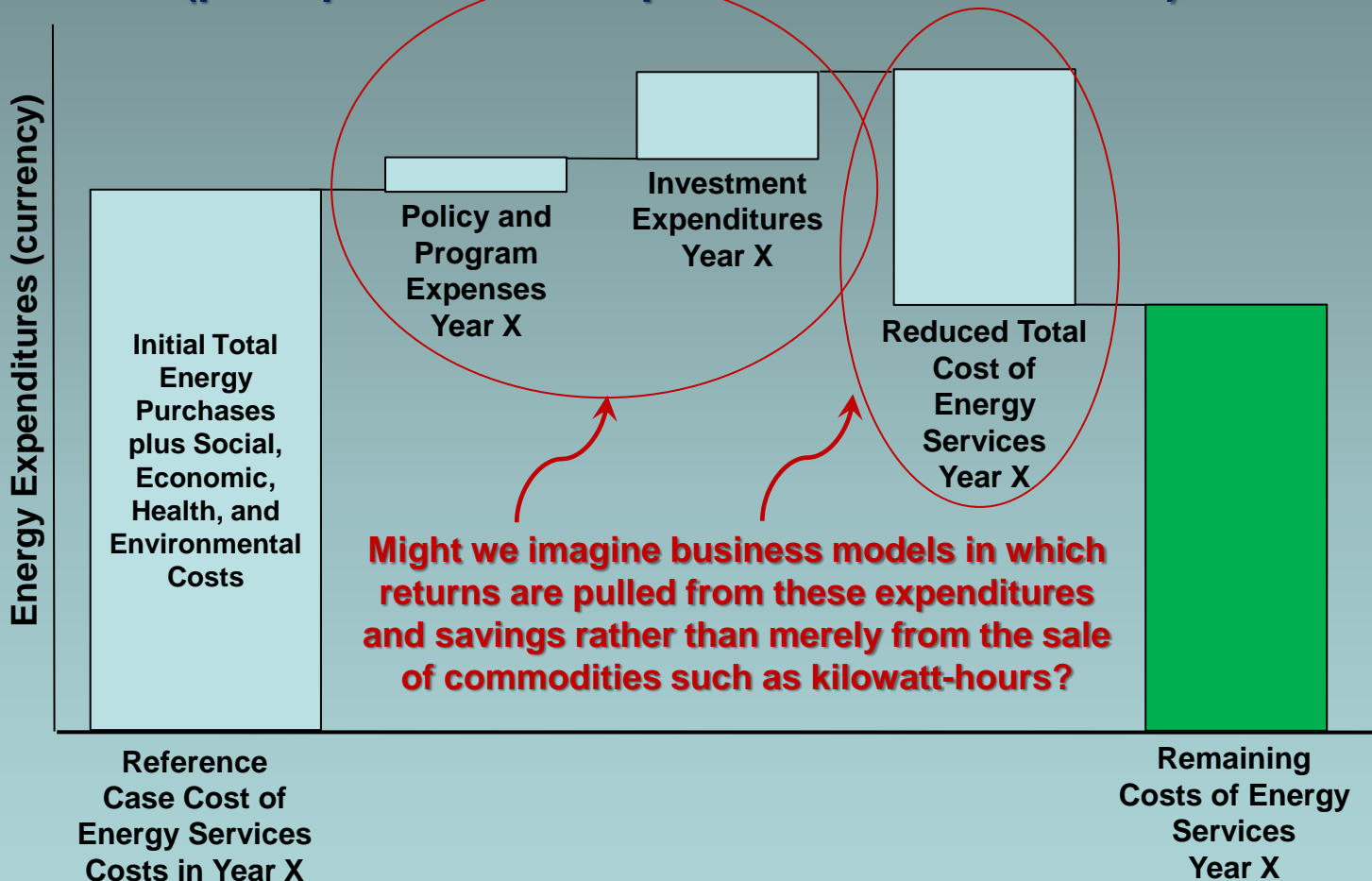
Sufficient to reduce
total World energy
consumption by ~40%!

With the prospect for a
more robust, a more
resilient and a more
sustainable economy. . .

**MORE
BY WASTE
THAN
INGENUITY?**

...an anemic ~16% Global energy (in)efficiency

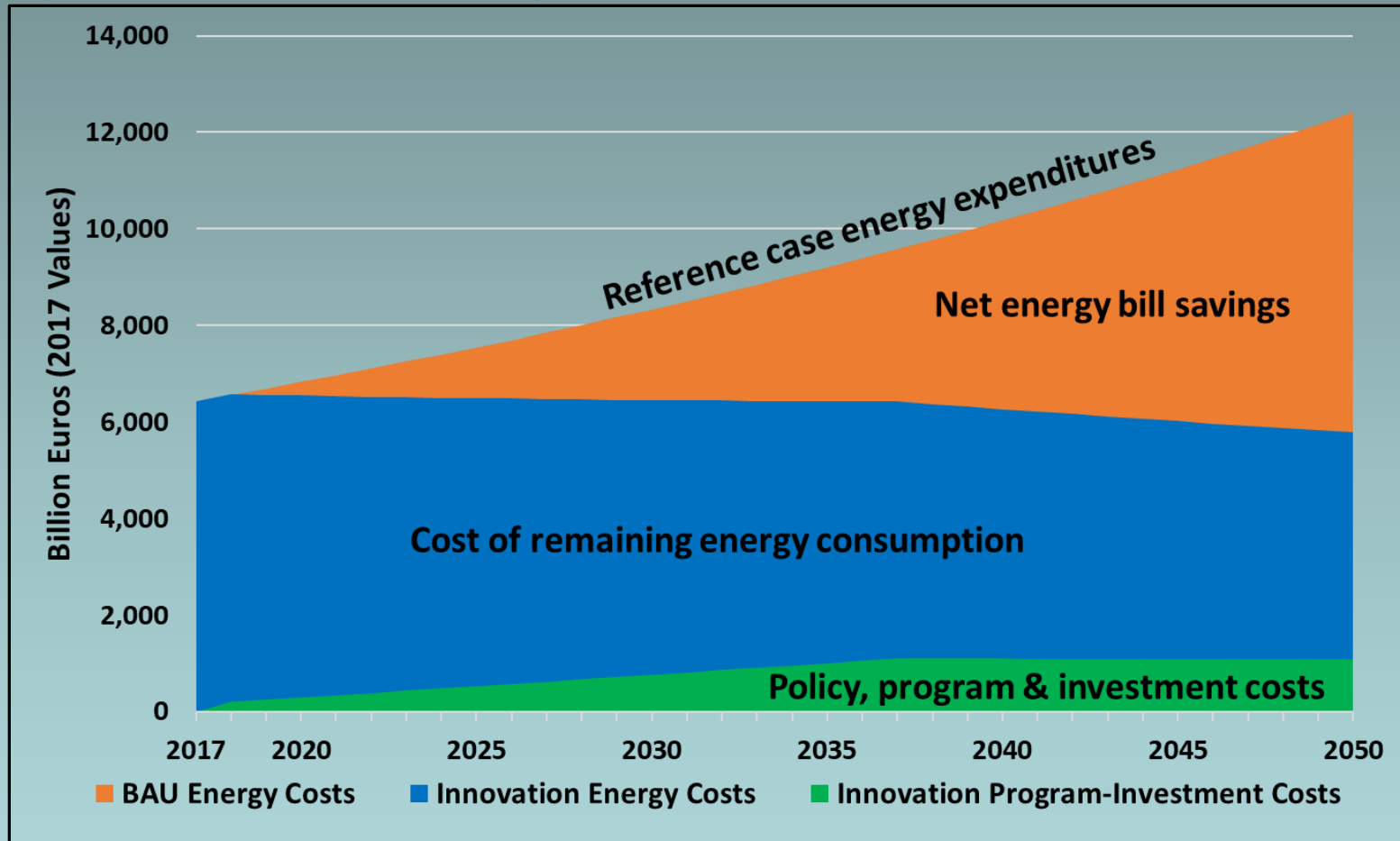
Economy-Wide Benefits of a Lower Cost of Energy Services (perhaps the most important slide of this talk!)



The combination of energy efficiency and new energy resources must be able to reduce the real cost of energy services each year, and in whatever year!

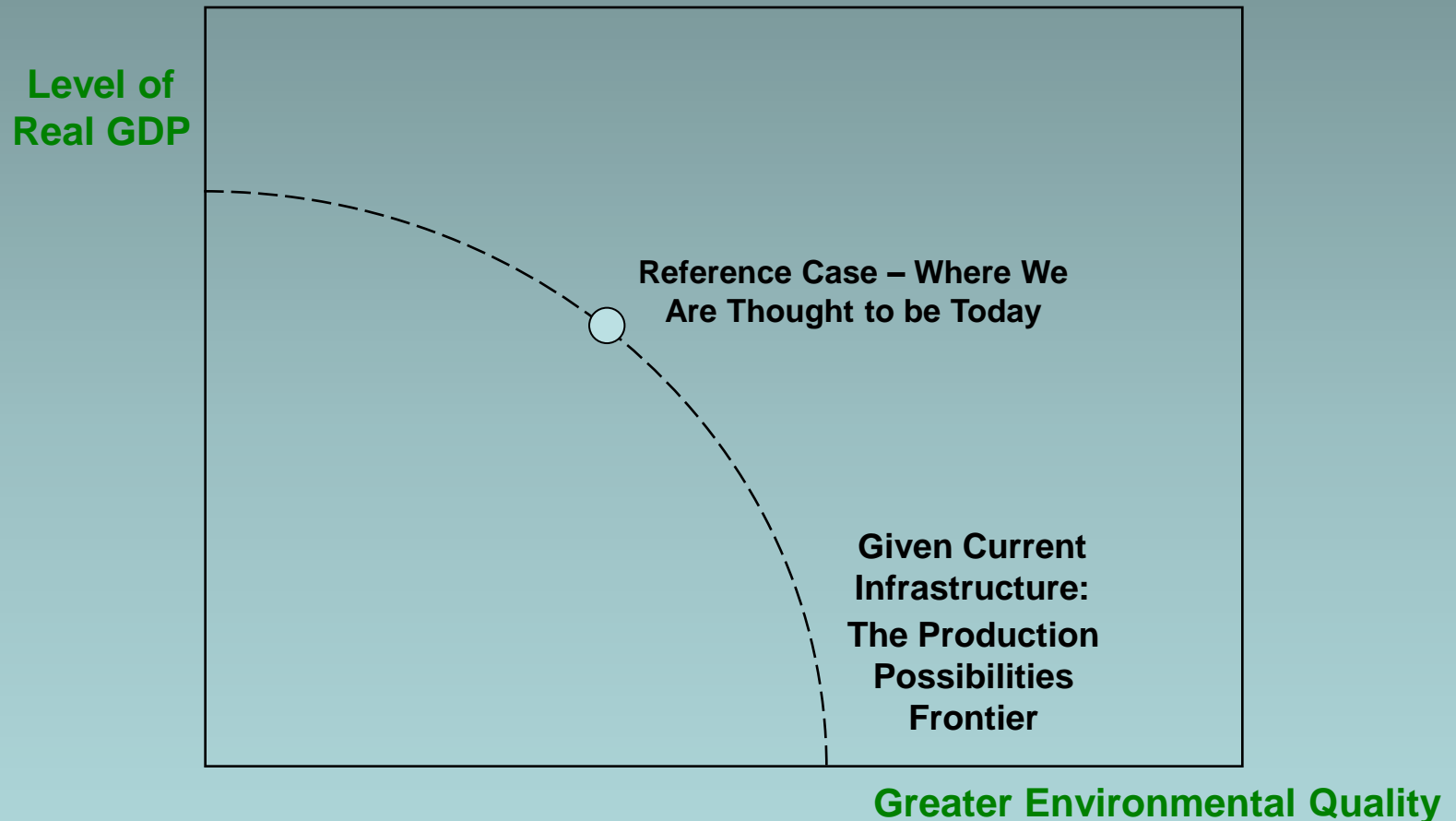
How Smart Programs and Policies Might Drive Global Savings

Figure 5. Impact of a Global Energy Efficiency Innovation Scenario

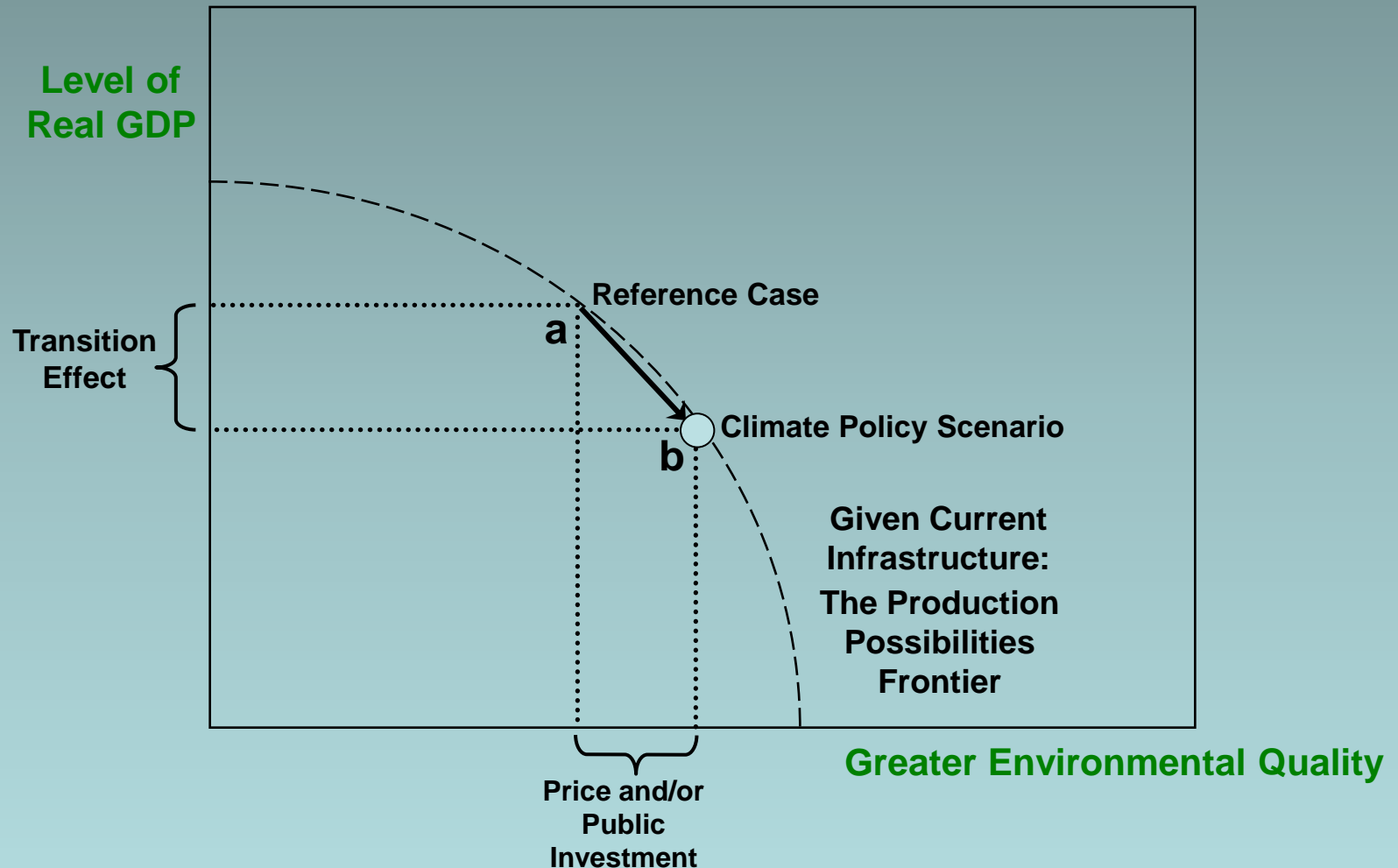


Source: *Smart Policies and Programs as Critical Drivers*. <https://tinyurl.com/yb64apo7>

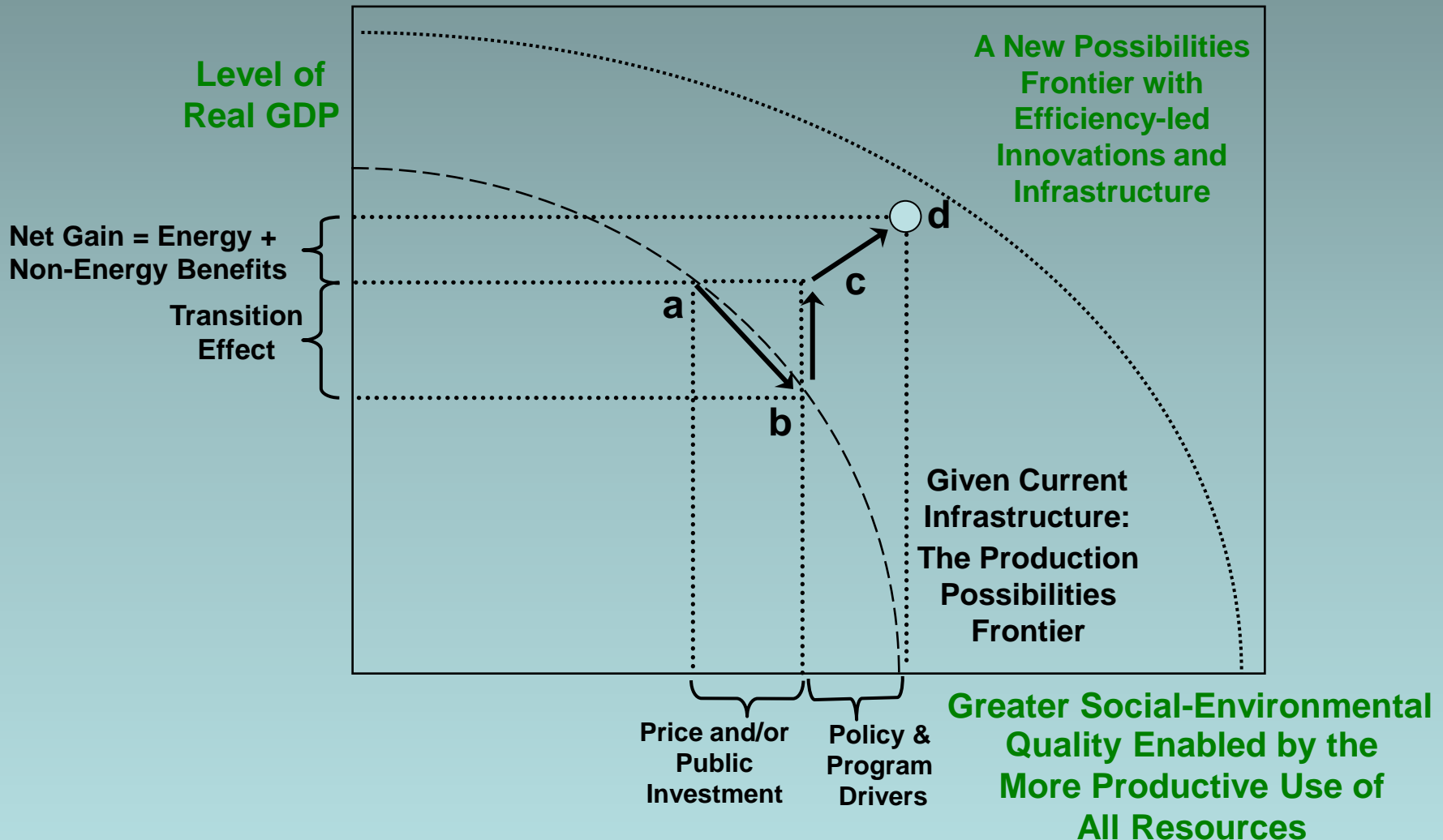
Modeling the Production Possibilities



Modeling the Production Possibilities



Modeling the Production Possibilities



Modeling the Production Possibilities

- Embracing social, environmental, and economic pathways forward;
- Including funding for policies and programs that enable the more productive use of all resources;
- In which new business models, with directed actions and investments, drive the multiple benefits.
- But it won't happen without purposeful effort that is properly and adequately funded.

Perhaps the Ultimate Efficiency Resource To Encourage Among Our Colleagues?

- Recalling the comment of early Twentieth Century UK essayist, Lionel Strachey, who remarked: *“[Too many people] guess because they are in too great a hurry to think.”*
- Jerry Hirschberg, founder and former CEO of Nissan Design, who noted that: *“Creativity is not an escape from disciplined thinking. It is an escape with disciplined thinking.”*
- And Henry Ford once said, *“Thinking is the hardest work there is which is the probable reason why so few engage in it.”*

The difficulty lies not with the new ideas, but in escaping the old ones. . .

John Maynard Keynes

Contact Information

John A. “Skip” Laitner

Principal, Resource Economist and Consultant

Economic and Human Dimensions Research Associates

Senior Research Economist

**Russian Presidential Academy of National Economy and Public
Administration (RANEPA)**

Immediate Past-President

Association for Environmental Studies and Sciences (AEISS)

Cell: +1 571 332 94 34

Email: EconSkip@gmail.com

Web: <https://theresourceimperative.com/>