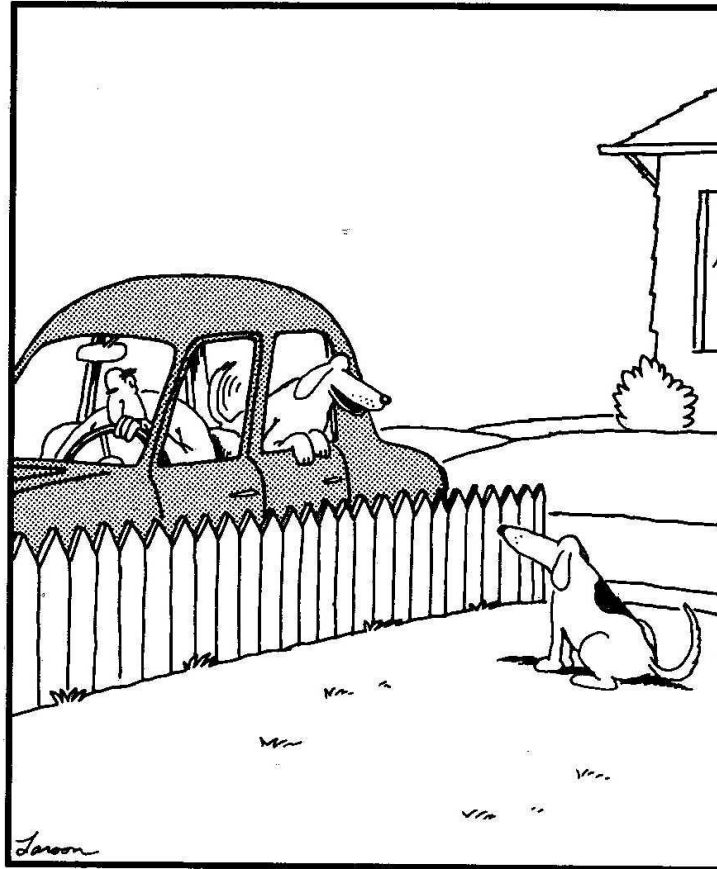


“The Third Industrial Revolution”
*How it Might “Future-Proof” the Economy and Make
It Much More Sustainable than Imagined **

John A. “Skip” Laitner
*Economic and Human Dimensions Research Associates
and
Russian Presidential Academy of National Economy*

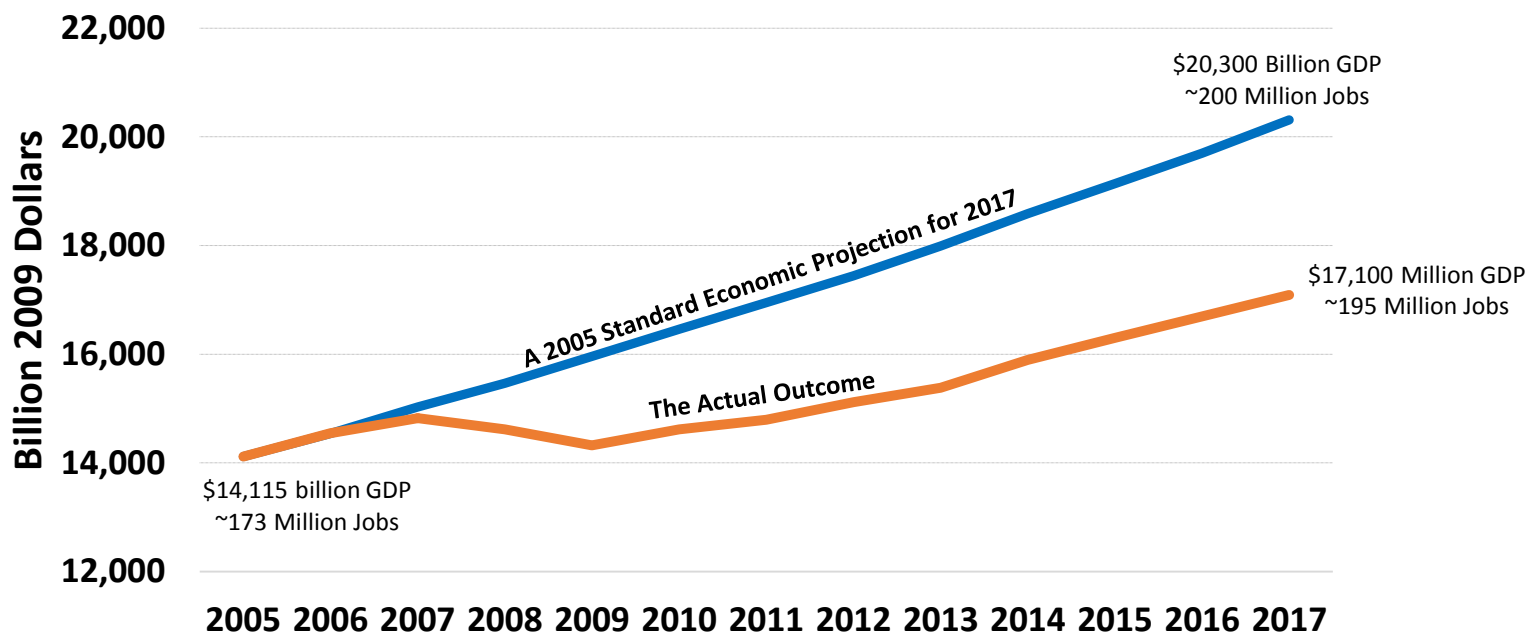
* In the spirit and tradition of Nobel Laureate and former Caltech physicist Richard Feynman, in his 1959 visionary talk, “There’s Plenty of Room at the Bottom.” See, <http://www.its.caltech.edu/~feynman/plenty.html>.

Not a Frivolous Assertion: Small Differences in Assumptions Can Make a Very Real Difference in Outcomes



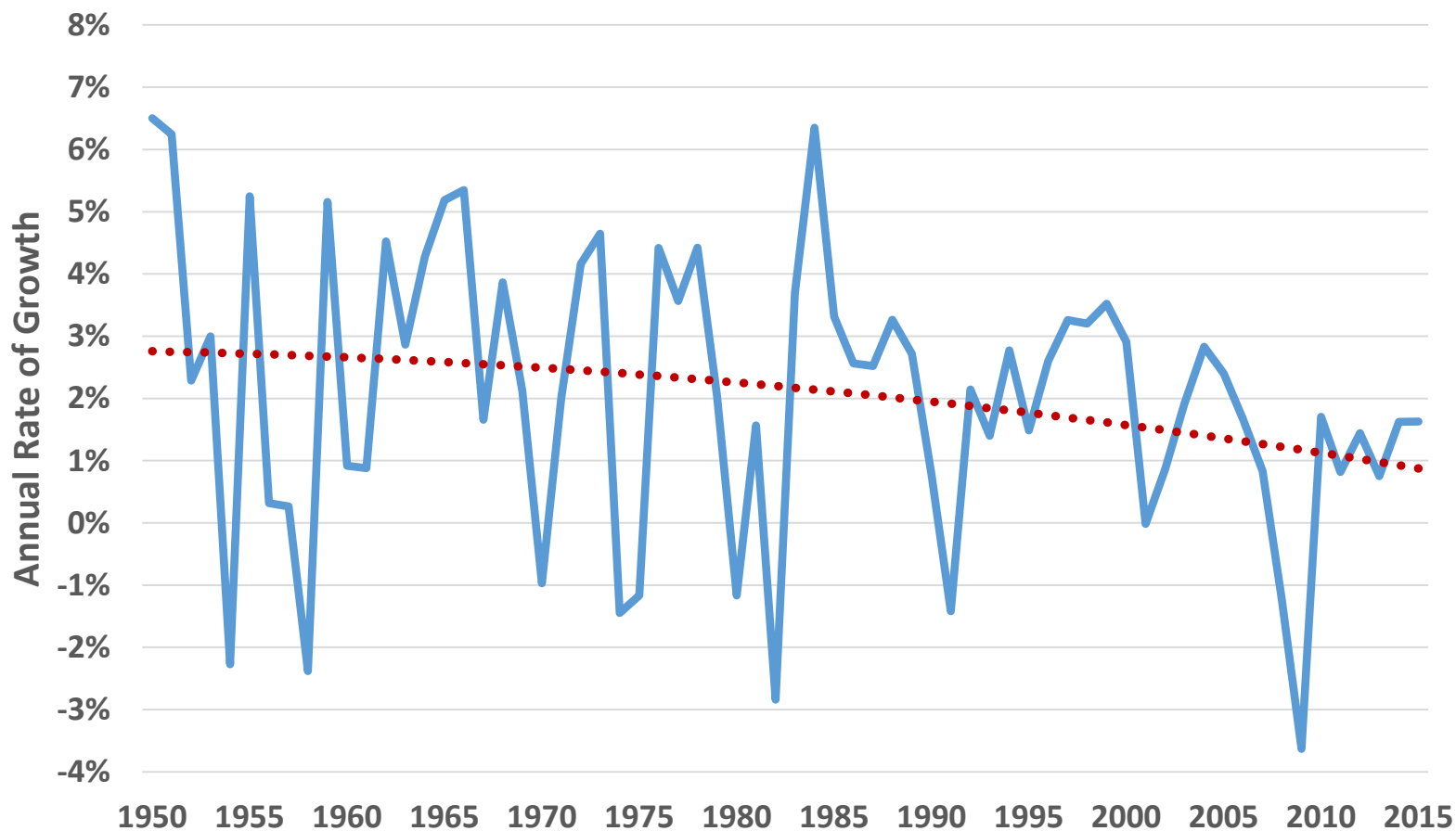
**"Ha ha ha, Biff. Guess what? After we go to the drugstore
and the post office, I'm going to the vet's to get tutored."**

Comparing Economic Projections and Actual Outcomes: United States 2005 to 2017



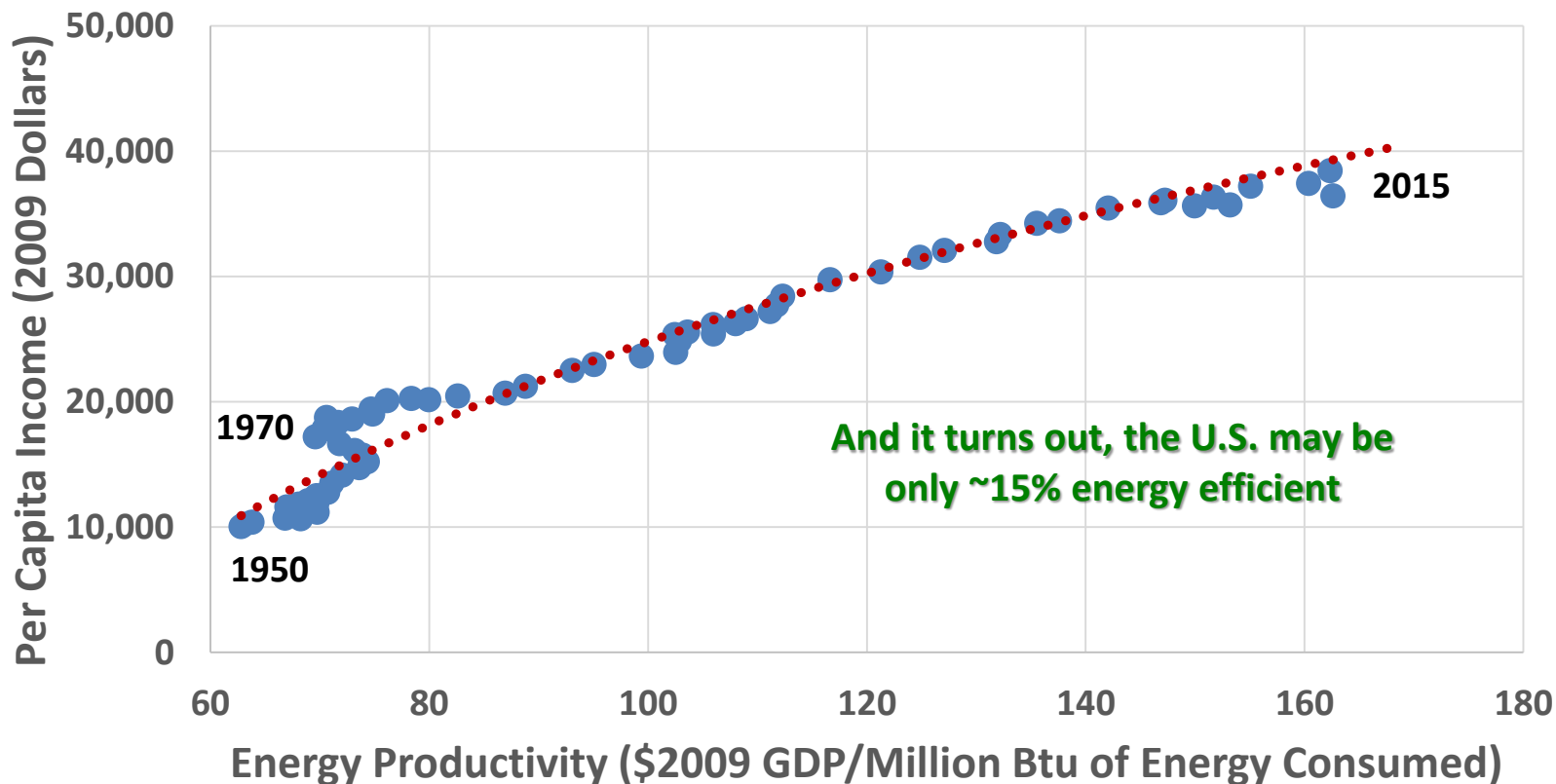
Source: Calculations by Laitner, using projections from the U.S. Energy Information Administration and other sources, May 2017.

Long-Term Trend in U.S. Real GDP Per Capita 1950-2015



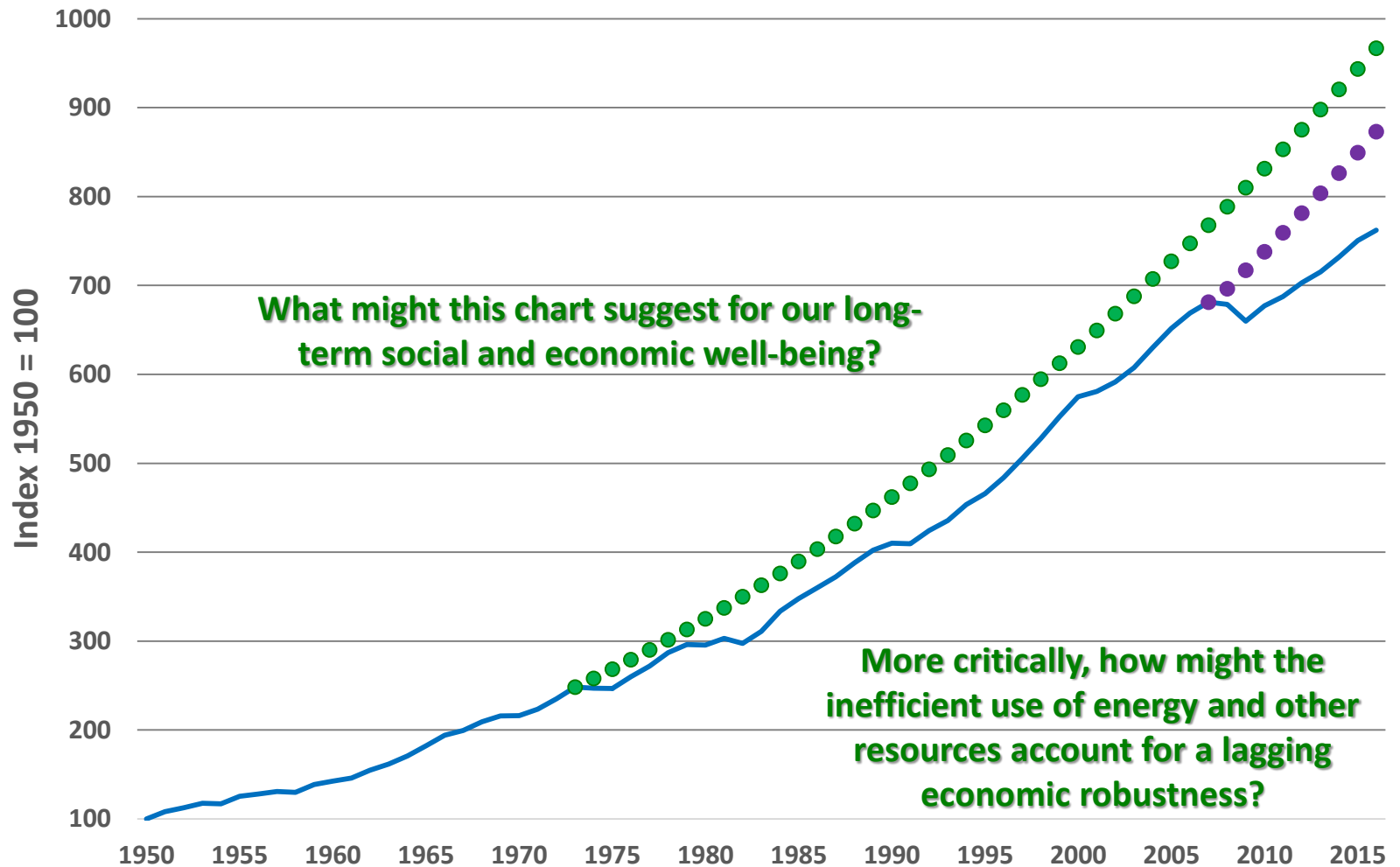
Source: John A. "Skip" Laitner based on U.S. Energy Information Administration Data, May 2017

The Connection Between U.S. Energy Productivity and Per Capita Income (1950-2015)

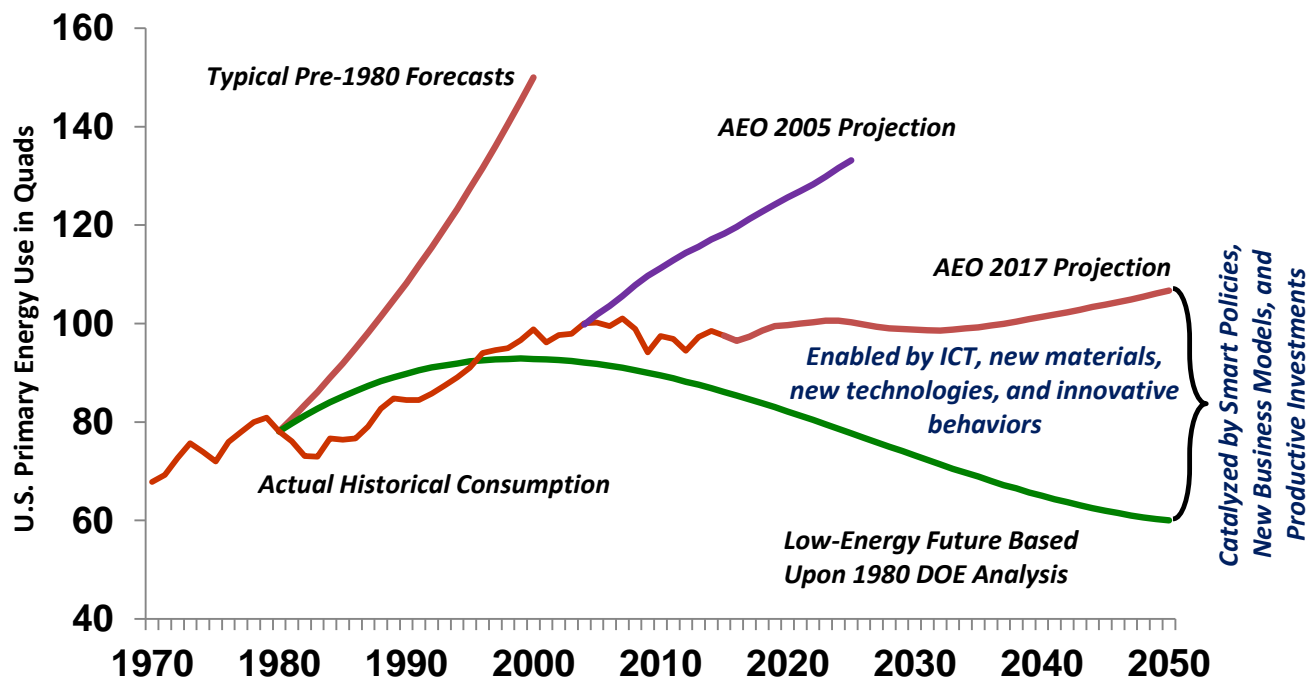


Source: Calculations by John A. "Skip" Laitner using data from the U.S. Energy Information Administration

Exploring U.S. GDP Trends 1950-2015



Key Insight: The Energy Efficiency Resource Is Larger than Generally Believed or Understood



Sources: DOE 1980 Policy Analysis, AEO 2005, AEO 2017, and Laitner Estimates 2017.

Emerging evidence and insights from Europe

With a Bit of Added Context

In his best-selling books, my colleague Jeremy Rifkin notes that any time you have a coming together of a new form of communication with a new form of energy, you've laid the foundation for an industrial revolution:

- ***The First Industrial Revolution*** – roughly corresponding to use of print media and coal/steam energy
- ***The Second Industrial Revolution*** – telegraph and telephone coupled with the internal combustion engine and electricity generation
- ***And the emerging (but not at all guaranteed) Third Industrial Revolution? A buildout of infrastructure that relies on interactive communications and distributed clean energy technologies anchored by large-scale energy productivity***

And Some Further Insights

- The economy-wide benefits and returns on the “Second Industrial Revolution” technologies and the larger public infrastructure are diminishing.
- A social and economic transformation is clearly needed – driven by purposeful effort that includes both directed actions and targeted investments.
- Hence, the development of ***Third Industrial Revolution (TIR) Strategic Plans*** by Team Rifkin.
- And the more productive and efficient use of all resources, especially energy, must underpin this transformation over the next three decades.

Who Is Acting How on These Ideas?

- Both Luxembourg (population 576,000) and MRDH (Metropolitan Region Rotterdam/Den Haag 2.3 million). . .
- Working with Rifkin, and our partners at Navigant Consulting and Fraunhofer Institute, we crafted strategic plans (Roadmap Next Economy) that propose to double the regional rate of energy productivity by 2050. All remaining energy needs are to be provided by renewable resources, also by 2050.
- With significant upgrades to public infrastructure, energy efficiency upgrades, and the deployment of renewable energy technologies, by 2050 the plans anticipate a cumulative total investment roughly equal to one year's GDP. For the State of Georgia, that might equal ~\$525 billion.
- The result will be a more resilient, robust and sustainable economy that also increases the net gains in jobs.

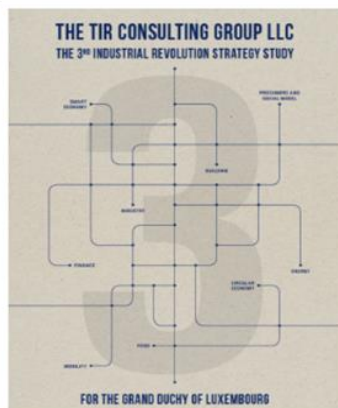
The 7 Ways Energy Productivity Can Improve the Robustness of a National or Regional Economy

- It can save money and lower dependence on imported oil and reduce the potential of other supply disruptions.
- It can minimize the volatility of energy and other prices.
- It will both lessen the threat of climate change and increase the opportunities for adaptation to shifts in climate patterns.
- It can boost overall economic productivity and job creation.
- It will lessen health and other environmental impacts.
- It will likely stimulate a higher level of innovation across all sectors—increasing the prospect for a resilient, a more durable, and a more vigorous economy.
- It will demonstrate a very real leadership that, in turn, may catalyze other regions to develop a similar roadmap, with synergies that amplify benefits and further reduce the risks.

MRDH and Luxembourg: Elevating to a Higher Level of Economic Performance

*‘Our world is in transition. We no longer live in an era of change, but are witnessing the change of an era. We are on the verge of the greatest social and economic challenge since the 19th century. Global trends like climate change, geopolitical changes, increasing migration, growing inequality, natural resource depletion (lagging rates of resource productivity) and the emergence of disruptive technological innovations are driving the transition to a systemic change. We need to anticipate this change that will **fundamentally alter the way we manage, power and move our society.**’*

MRDH Roadmap Next Economy, February 2017

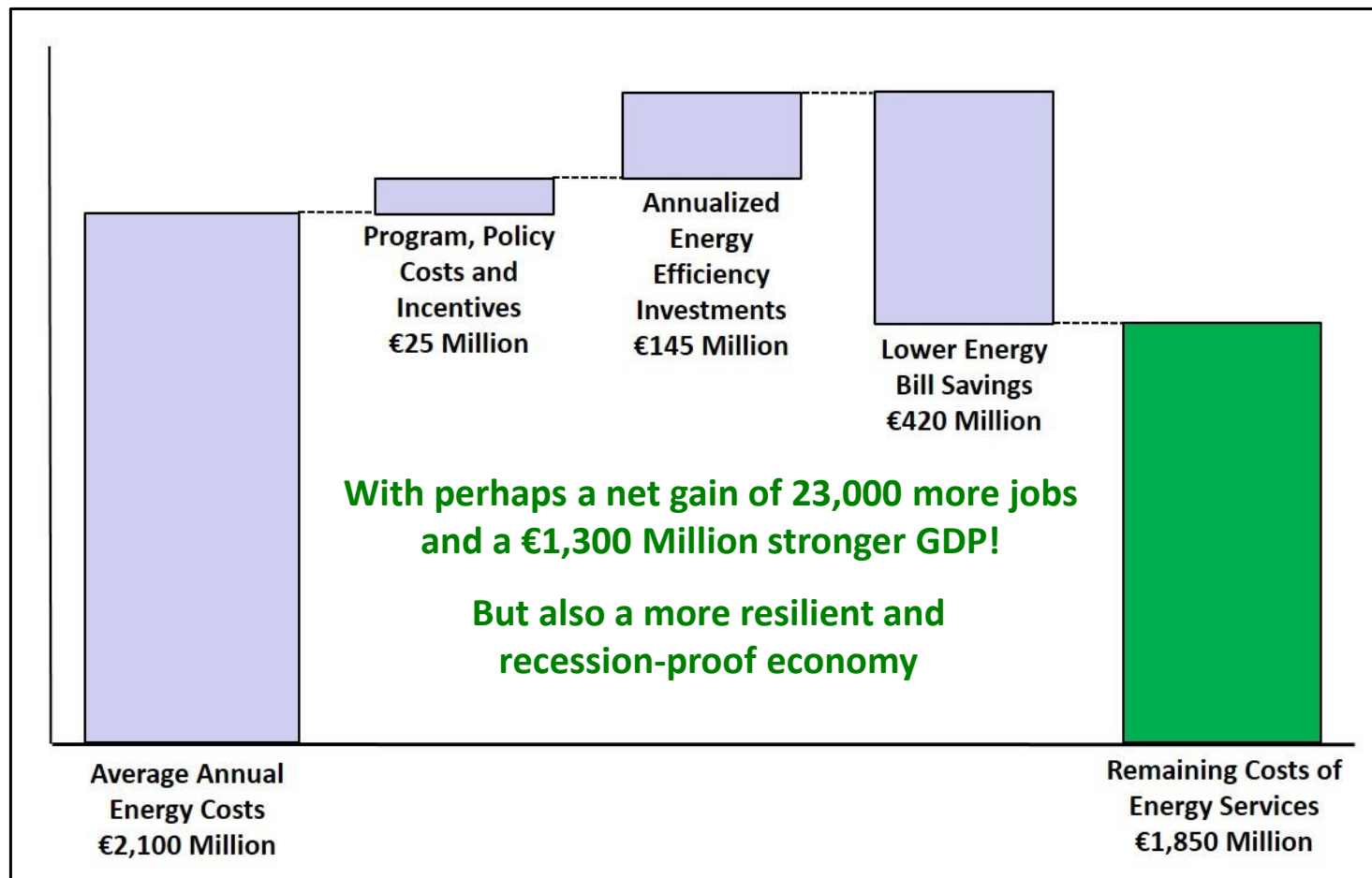


*‘Today, a transition toward the Third Industrial Revolution is underway, and Luxembourg is the first country to get prepared at the national level. During the forum, different parts of the Grand Duchy’s national strategy will allow you to discover **how the country enrolls in the co-construction of this new sustainable economic model.**’*

IMS Luxembourg, November 2016

The Luxembourg Future Cost of Energy Services

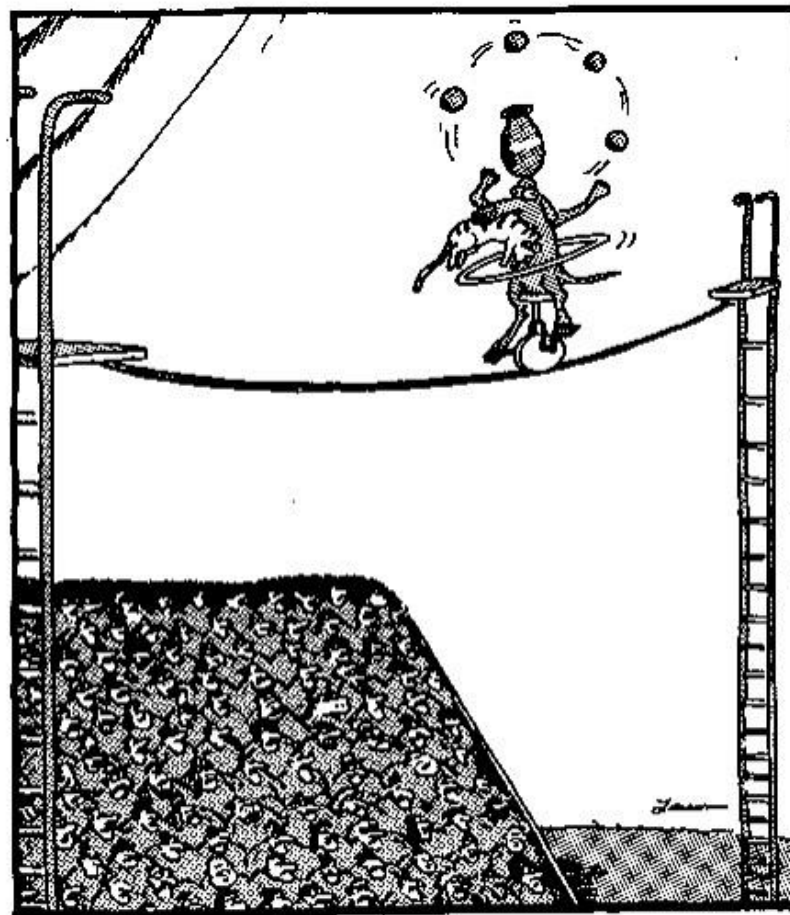
Figure 3. The Average Annual Payments for Energy Services, 2016 through 2050



Source: John A. "Skip" Laitner (September 2016).

Perhaps Our Ultimate Economic and Energy Efficiency Resource?

- Recalling the comment of early Twentieth Century UK essayist, Lionel Strachey, who remarked: *“Americans 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.”*



High above the hushed crowd, Rex tried to remain focused. Still, he couldn't shake one nagging thought: He was an old dog and this was a new trick.

Contact Information

John A. “Skip” Laitner (@EconSkip)

Principal Economist and Consultant

Economic and Human Dimensions Research Associates

<https://theresourceimperative.com/>

Tucson, Arizona 85750

c: (571) 332-9434

Email: EconSkip@gmail.com

“Policy Pathways to an Advanced Energy Economy”

Professor Marilyn Brown

Georgia Tech, School of Public Policy