

# Incremental and Transformational Change

## *Innovations Case Discussion:* Better Place

Shai Agassi's story of his evolving personal interest in energy issues, and the evolving business plan of his electric vehicle company, Better Place, provides an important lens on the pace and drivers of innovation.

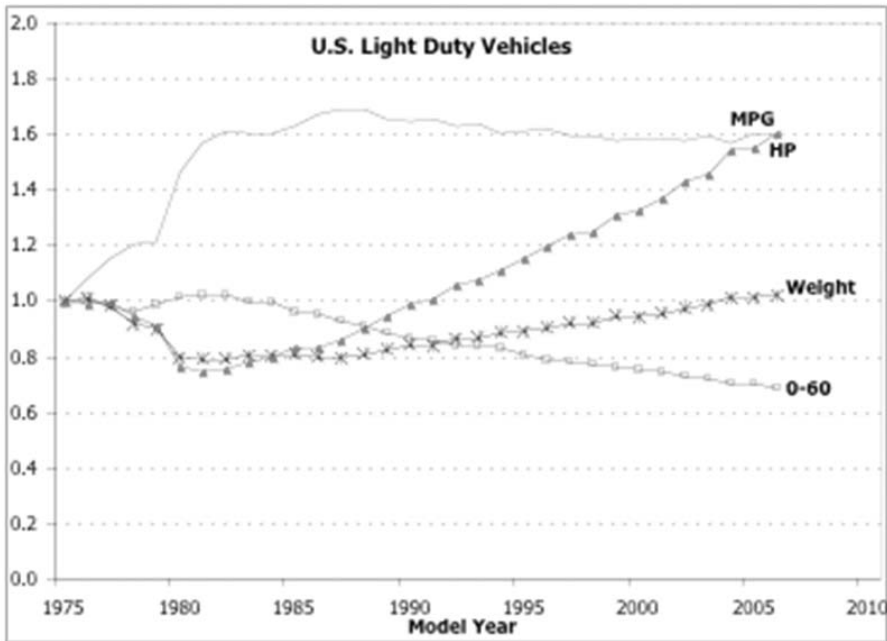
First, as Shai describes, his interest in energy issues evolved from his great success in the software industry. As a successful entrepreneur, Shai became inspired by the imperative to change our energy economy, and he recognized that his background and drive might be a unique advantage in becoming an agent of innovation and change.

The transportation sector critically needed, and still needs, this sort of fresh look and novel business model. For a period in the late 1970s and early 1980s, average vehicle economy in the United States rose steadily, due to the requirements for greater fuel efficiency through the Corporate Average Fuel Economy (CAFE) standards and the lingering worries over oil prices from the two oil embargoes of the 1970s. After that, however, little changed in the transportation sector. In fact, looking at Figure 1, we can see a clear trade-off in the trends in vehicle efficiency and performance: gains in vehicle efficiency were sacrificed for performance. Perhaps improvements in both could have been achieved. Undeniable, however, is the decades of stagnation in improvements in energy efficiency, financial savings, or carbon savings.

The petro-politics of the 1980–2005 period were tumultuous, including the Iran-Iraq war, the first and second gulf wars, and the ascension of Japanese car companies to a leading global position. Out of that period, different nations and

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**Figure 1.** Changes in average mile per gallon (MPG), engine horsepower (HP), vehicle weight, and acceleration (0-60 speed).

The period of dramatic increase in vehicle efficiency from 1975–1983 (CAFÉ standards) can be seen clearly, as can long-term trends of improved performance despite increasing vehicle weight over the following three decades. These ‘improvements,’ however, clearly came at the expense of greater efficiency, which declined slightly over 30 years. Each of the data sets is referenced to a normalized baseline value of “1” in 1975.

companies took very different lessons. The Japanese began to make greater efficiency—and then hybrid vehicle technology—part of their long-term plans. Meanwhile no clear message emerged from the U.S. industry, beyond larger and larger vehicles and some interesting but largely short-lived efforts at developing electric vehicles.

All this can be seen, in retrospect, as a clarion call for new, fresh, and innovative ideas. Shai Agassi is one of many entrepreneurs who took up the challenge. His model—leapfrogging over the emerging plug-in hybrid technology to go directly to pure electric vehicles—is notable and challenging at the same time. The benefit of pure EV technology, of course, is the complete removal from the car of internal combustion, and its associated ball-and-chain of engine and fuel weight. The drawbacks come in the form of a need to build market share today, despite uncertainty over battery costs, battery-charging standards, and battery technology that will surely evolve rapidly in the coming years.

In this new and changing landscape, Better Place planted its flag with a much-

debated and questioned business model that is as innovative as the technology it embraces. Time will tell if the company can make this transition work; that may depend as much on the trends in oil prices and battery availability as the cleverness of the Better Place team. But the message is clear: while many are betting on improved internal combustion engines and greater efficiency standards, still more companies see the plug-in hybrid as the next new thing. Each of these views has merit. The incumbent technology—internal combustion engines—can clearly be made more efficient although such engines are ultimately limited by the thermodynamics of combustion. Plug-in hybrid vehicles offer a dramatic change—roughly two to three times the efficiency of internal combustion engines, depending on the carbon content of the electricity supply used to charge the batteries.<sup>1</sup> By contrast, pure EVs, featured by Better Place and in other emerging models and business plans, offer a break from the vehicle designs of today, and could achieve even larger savings per vehicle, but they face the constraints of the logistics and costs of access to internal-combustion engine vehicles when needed.

In the end, in fact, this last point may shape the long-term success and popular judgment of the Better Place model: can the infrastructure needs of the pure EV vehicle *systems* model be developed, disseminated, and paid for in ways that make this business model a true challenger to a combination of improved internal combustion engine vehicles, plug-in hybrids, better mass transit, and improved planning? On this front, the jury is out, but we vitally need a diversity of experiments, many of which we can hope will take hold in a low-carbon economy.

### **Endnote**

1. Lemoine, Kammen, & Farrell, 2008.

### **References**

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