

electric motors with batteries charged by onboard gasoline engines. But these cars still produce CO₂ and there is no consideration of what will happen to it or of the availability of natural gas and gasoline past the Hubbert maximum. One of the more frightening things which Romm quotes is a Lawrence Livermore National Laboratory report of 2003 that explains that in order to stop global temperature from rising more than two times as a result of gas emissions, we should be building at least two nuclear reactors per week for 50 years!

In spite of all his price-based objections, Romm *is* an advocate of the Hydrogen Economy. Romm foresees no government action until 2035, but oil will fail to meet our needs by 2010. At this point, he sees government intervention and the change to the Hydrogen Economy as just beginning—a change that could take 50 years!

In fact, Romm says "enabling a shift to a Hydrogen Economy may be one of the central tasks of the United States as we cope with the 21st Century and the major energy and environmental problems which it gives us." He says on page 189, "Only government action can reverse the growth of carbon dioxide emissions until hydrogen and other new technologies can help to reduce emissions sharply."

This book should be read and understood by every citizen, for it makes clear that environmental terror is much nearer than we thought and that the (essential) Hydrogen Solution will be more expensive than we feared.

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Notes

- ¹ There's no way to avoid this. Suppose, even, that some vast store of oil or natural gas should be discovered in 2009. Its use, whilst emitting CO₂ into the environment, would lead to the disaster of sudden climate change. Its satisfactory sequestration, e.g., burial in the deep sea, would mean an infrastructure of pipelines hardly less than those demanded by the renewables.

Copies in Seconds: Chester Carlson and the Birth of the Xerox Machine
 by David Owen. Simon and Schuster, 2004. 306 pp. \$24.00 (cloth). ISBN 0-7432-5117-2.

We have had to wait too long for a biography of Chester Carlson, who was the sole inventor of xerographic copying. Carlson was not just a remarkable person; he was remarkable in unusual ways. Experts had declared impossible his idea for a machine that would make copies on ordinary paper. Carlson, however, had the requisite qualities for success. David Owen correctly identified these as "his

persistence, his imperviousness to repeated rejection, his emotional self-reliance, his tolerance for solitude, and his independent mind."

Owen takes his readers through the several stages of Carlson's life: a childhood of appalling poverty; a struggle, eventually successful, to obtain a higher education; the early experiments and initial success with xerography; then years of unsuccessful efforts to find a company willing to develop the invention; and its final extraordinary success—both in practice and in almost unbelievable financial returns. Among these phases the longest was taken by the development of a marketable machine. Almost one third of Owen's book narrates the efforts of numerous physicists, engineers, and others to accomplish this development. The chapters describing this phase include considerable technical detail, but Owen has a gift for the exposition of complex technical problems. It may seem to a casual reader that Chester Carlson had little to do with this long phase. This is incorrect. Although diffident, Carlson contributed actively to the development of a working machine. No fewer than 36 additional patents relevant to the final successful machine are in his name. Moreover, his quiet persistence to "get on with it" must have shortened, in the end, the long time taken to develop a working machine.

At the age of 50, Carlson found himself immensely wealthy, but with nothing to do. Although he was not an ascetic, he had no interest in the activities that engross most people of great wealth. Even as early as the 1950s, Carlson had begun divesting himself of his wealth. With the assistance of a single secretary, he handled huge correspondence. He carefully appraised every applicant who appealed to him. His donations sometimes began with small contributions; he increased these as his confidence in the recipients grew. Sometimes he sought out recipients who had not asked him for assistance.

Carlson made important contributions to the study of paranormal phenomena, in which his wife (who had some capacity for these) strongly encouraged him. He always gave anonymously. He once told me he had two reasons for anonymity. The first was standard enough: publicity for a donation would invite more solicitations. Secondly, however, he wished no credit for what he gave. Although he was not a declared Buddhist, he had supported some Zen teachers and had strong inclinations toward Buddhism. Public acknowledgment of his gifts, he thought, could increase his attachment, as Buddhists say, to worldly affairs.

Carlson was a great man; just to have known him is to have had one's life enriched. David Owen's biography is wholly admirable. I hope it will be widely read, especially by researchers of anomalies who may feel rejected or believe themselves to be.

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