

## SMITH-PUTNAM WIND TURBINE EXPERIMENT

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I am honored to speak to you about the Smith-Putnam wind turbine experiment since it was carried out 30 years ago. Also, I actually had very little direct participation in the project other than to see that the bills were paid - which, incidentally, at times presented some real problems.

I assume that many of you here have read Palmer Putnam's book "Power from the Wind". It was written at my request to try to summarize the story of our efforts to test the feasibility of large scale utilization of the natural energy available in wind for the production of electricity in commercial quantities and to learn something of the economics involved.

Putnam was introduced to us through Mr. Tom Knight, then commercial vice-president of General Electric in Boston, in the early fall of 1939. Mr. Knight and Howard Mayo, the long-time manager of our Boston office, had often worked together on hydroelectric projects throughout New England. They were both concerned about the dwindling market for hydro because most of the commercially feasible sites had already been developed. Our organization was already deeply involved in the promotion of pump storage developments. It seemed to us that wind power in combination with pump storage would be a natural partnership. And, if it could be proven technically and economically sound, it would give us both a new product and an expanded market for our existing lines of hydraulic turbines and pump turbines, which in 1939 supplied the lifeblood for our company.

We fully realized that in undertaking the project we were taking a real risk. We were then a comparatively small family-owned company so it was easy to get a quick decision. Our board of directors voted to take the gamble and the project was born.

Putnam had already done much preliminary work and had gathered together a very knowledgeable group who had been assisting him on a part-time basis as their free time permitted. Having secured a sponsor,

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\*Presently Allis-Chalmers.

Putnam undertook the task of organizing the group of eminent scientists and engineers who would be responsible for the selection of the site and the design of the prototype test unit. Dr. J. B. Wilbur of Massachusetts Institute of Technology served as chief engineer of the project in collaboration with George A. Jessop, chief engineer of our company. Unfortunately, neither Putnam nor Wilbur, both of whom are still active, are able to be here today because of other long-standing prior commitments.

"Power from the Wind" sets forth the story of the project very completely, so I will not attempt to elaborate except to explain why so much of the fabrication of the unit had to be farmed out. World War II was already being fought in Europe and our manufacturing facilities in York were completely loaded with orders both for our regular products and also for various military items. So, when the time came to actually begin the manufacture of the experimental unit, we had no capacity available in our own facilities, and all components had to be farmed out for manufacture by other companies in order to meet the delivery requirements.

While model tests, design, and site selection were underway in the early months of 1940, it became fairly obvious that the United States would eventually become embroiled in the war. In this event materials and manufacturing sources would probably no longer be available for a project such as ours with little or no chance of being assigned a priority rating. This prospect necessitated making design decisions so that orders could be placed for forgings and other critical items in short supply long before final studies were completed. Unquestionably the calculated risks involved, forced upon us by our timing, ultimately contributed to some of our structural and mechanical problems and to the final failure of one of the blades which brought our test program to an untimely end.

Considering the very difficult working conditions prevailing both in factories and the field, I feel that our team turned in a most remarkable performance in producing and installing such a complex mechanism in a very limited time. The blades of the test unit were rotated by the wind for the first time on August 29, 1941, just 23 months from the time of our first conversation with Putnam and Knight in Boston in 1939.

Putnam's book sets forth the many problems encountered during the tests, and how they were at least partially solved. Electricity was generated in commercial quantity and delivered to a utility transmission network, the first synchronous generation of power from the wind, when the unit was phased-in to the lines of the Central Vermont Service Corporation at 6:56 P.M. on October 19, 1941.

The project thus proved by actual demonstration the feasibility of generating electricity in useful quantity from the wind. What it did not prove is that this can be done on an economically feasible basis!

Putnam, in his book, sets forth the trials and tribulations, delays because of component failures and difficulties in securing replacements, and all the other problems that plagued the experiment until the blade failure, which occurred in a known weak spot, at 3:10 A.M. on March 26, 1945.

After this blade failure, S. Morgan Smith Company, with its limited financial resources, reluctantly made the decision that it could no longer continue to finance the project. The test unit was dismantled and removed from the site, the patents and patent applications were dedicated to the public domain, and the investment was written off to experience.

"Power from the Wind" was published in 1948 as our final contribution to the public. I and, I am sure, all of the many dedicated individuals who labored so hard and contributed so much to the experiment found it a fascinating episode in their lives. And, I believe, most of us still harbor the hope that some day, somehow, someone will revive interest in carrying on further research and experimentation in this field.

With shortages of power developing all over the world, with the growing realization that the world's fuel reserves are not inexhaustible, and with the knowledge that our present known methods of using our dwindling fuel reserves are damaging our environment, I believe the time has come for another close and hard look at wind power as at least a partial solution to some of these problems.

I am delighted that this workshop has been convened and I am very hopeful that you learned gentlemen gathered together here in Washington will produce some novel and useful approaches which will lead to further research and experimentation and to a solution which will make power from the wind a practical and useful energy source for mankind.