



DATE: March 11, 2009

SUBJECT: SB 1094 TESTIMONY

The State of Connecticut has world recognized hydrogen and fuel cell technology firms, but singularly lacks hydrogen fueling infrastructure to enable practical applications of fuel cell technologies, notably in the transportation sector. Avalence strongly supports the establishment of a hydrogen transportation corridor along the Merritt Parkway, other state highways and the installation of Hydrogen Refueling Stations at transit districts throughout the state. Avalence encourages the installation of onsite hydrogen fueling stations to provide "green" hydrogen fuel for these vehicles and to meet select premium power/backup power needs – affording many benefits to the municipality, its environs and nearby residents such as reduced air pollution and reduced noise pollution. The Avalence *Hydrofiller* is uniquely suited to integrate with solar, wind and hydro power to produce "green hydrogen" renewable fuel for transportation.

DECD has designated the hydrogen and fuel cell industry base "Cluster" status in Connecticut, worthy of investment due to the high quality job creation and sustainable revenue stream this emerging clean energy industry offers our state. Establishing Hydrogen Refueling Stations in Connecticut are high impact projects that create high technology manufacturing jobs and deploy infrastructure that preserves and greens our transportation network while fortifying emerging domestic clean energy industries in Connecticut for success in the global marketplace.

Establishing fuel cell vehicles and multiple hydrogen refueling hubs in the state will have a direct and profound impact on high quality job growth in the state of Connecticut. For example, Avalence is a small business spun off from two longstanding CT-based firms; its 'globally first', compressor-free *Hydrofiller* technology advances the commercial viability of onsite production of clean hydrogen energy. *Avalence employs the services of over 46 Connecticut-based suppliers in the course of business* – a community of hi-tech engineering and manufacturing concerns. For each job created by Avalence, an additional 1.31 jobs are indirectly supported elsewhere in Connecticut. As Avalence deploys its *Hydrofillers* and grows, the economic benefit to the state employee base and revenues is dramatic.

In sum, Hydrogen transportation infrastructure investment will improve economic and environmental efficiency, build a modernized infrastructure system and healthy communities, while generating lasting financial security.

Sincerely,

A handwritten signature in cursive script, appearing to read "Martin Shimko".

Martin Shimko
President

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Transportation Bill Project
Renewable Hydrogen Infrastructure at CT Public Transit Agencies

- Project Result: Renewably Derived Hydrogen Fueling Infrastructure Available Throughout the State For Both Transit Fleet and Individual Vehicle Fueling
- Stakeholders: Greater New Haven Transit District, Town of Hamden, Avalence, LLC, General Motors, Hybra Drive, Four Additional CT Transit Districts: Norwalk, Norwich, Hartford, and Danbury
- Job Creation in CT: 85 Clean Energy Manufacturing, High Tech Jobs from Infrastructure Only
- Funding Needed: \$9.5 Million over 18 months

Project Goal

The State of Connecticut has world recognized hydrogen and fuel cell technology firms, but lacks sufficient hydrogen fueling infrastructure to enable deployment of fuel cell technologies in the transportation sector. The proposed project will utilize Connecticut's Transit District system to efficiently build out hydrogen fueling infrastructure for both public fleets and private vehicles, serving the states main Interstate transportation corridors. In addition each fueling station will be "sheltered" by a 400 sq ft solar panel that will contribute 10 to 20% of the electricity required to fuel the vehicles, supplying "green" hydrogen fuel.

This project will springboard from an existing project to install an Avalence *Hydrofiller 175* (produces 10 kg/day) hydrogen fueling station at the Town of Hamden Public Works Building. This station will service vehicles operated by the Greater New Haven Transit District (GNHTD) and could also be made available for public fueling. We propose to build on this project by expanding the capacity of the Hamden station and adding hydrogen fueling infrastructure to four additional transit agencies in CT with facilities and demographics suitable for installation of Avalence hydrogen fueling stations: Norwich, Norwalk, Hartford, and Danbury. Like Hamden, these four additional transit agencies utilize cutaway vehicles that require half of the hydrogen on a daily basis than full sized busses. This reduces the size and cost of the initial hydrogen fueling stations while maximizing the public exposure to hydrogen powered vehicles and still providing adequate fuel production to allow public access to hydrogen fuel. Additional, these Transit Districts have skilled personnel available who are appropriate to maintain both hydrogen vehicles and fuelers, and these locations serve the state's main transportation corridors of Interstates 95, 91, 84, and 395.

Project Readiness

This roll-out of hydrogen stations is "shovel ready" and can begin immediately as the preparatory work has already been done for the Town of Hamden; site requirements have been fully vetted by appropriate town officials, permitting is already underway and Greater New Haven Transit District (GNHTD) has issued the contract to install an Avalence *Hydrofiller 175* fueling station. The *Hydrofiller* is completely designed and proven, and Hamden is ready to immediately start the build and install process. The Town of Hamden expects to accept delivery of the hydrogen fueling station within 9 months.

GNHTD is stewarding a parallel effort to build and deliver the "cutaway" busses used by CT Transit Districts. This program could be accelerated to meet the vehicle needs of the transit infrastructure build out described here. In addition, General Motors has expressed interest in operating some of their fuel cell passenger vehicle fleet. They are willing to lease several of their fuel cell passenger vehicles to municipalities if the fueling infrastructure is in place to service them.

Project Schedule and Cost

Phase 1 (First 9 Months)

The station at Hamden will begin with installation of 6 modules of the *Hydrofiller 175* fueler supplying 60 kg/day of hydrogen fuel, sufficient to service the 4 cutaway transit busses planned for the initial implementation. **Infrastructure Cost - \$3 M**

Phase 2 (Second 9 Months)

In the second phase of the project an additional 6 *Hydrofiller 175* modules will be fabricated along with a large scale *Hydrofiller 2500* fueling station (150 kg/day). The *Hydrofiller 2500* will be installed at Hamden, expanding daily fueling capacity there sufficient to supply 15 cutaway transit busses, or 5 full-scale 40 foot fuel cell busses (typical of the UTC vehicles), or 100 typical fuel cell vehicles or combinations thereof. The smaller *Hydrofiller 175* modules originally installed at Hamden will be relocated and added to the 6 units built in the second phase for installation at the 4 other transit district sites (in groupings of three *Hydrofiller 175* modules), in order to support 2 H₂ fueled vehicles at each Transit Agency.

Hamden – Servicing 10 vehicles, 150 kg/day fuel

Infrastructure Cost - \$3 ½ M

N, N, H, D – Servicing 8 vehicles (2 each), 120 kg/day total fuel

Infrastructure Cost - \$3 M

This process demonstrates the graduated build out of hydrogen fueling infrastructure that can be repeated in an ever increasing number of sites. Additional modules of the *Hydrofiller 2500* can be added to mature sites as the number of vehicles supported grows. This process can be duplicated at other location types such as service plazas, colleges, etc.

Job Creation

Completion of this program will have direct and profound impact to high quality job growth in the state of CT resulting just from the placement of the hydrogen infrastructure. Avāence is a small CT-based business spun off from two longstanding firms. Avāence employs the services of over 46 CT-based suppliers in the course of business. When the overall CT-based supply chain is factored in, the economic benefit to the state employee base and revenues is dramatic. For each job created by Avāence, an additional 1.31 jobs are indirectly supported elsewhere in Connecticut. For every \$1.00 of revenue generated by Avāence, an additional 84 cents of revenue is received by the state of Connecticut. For every \$1.00 paid by Avāence to its employees, an additional 72 cents is paid by other CT-based employers in the Avāence supply chain.

This project will create approximately 25 new jobs at Avalence, which yields a total job creation of approximately 60 jobs statewide derived solely from the installation of hydrogen fueling stations. The addition of the 75 jobs associated with the operation and maintenance of the fleet vehicles and 25 jobs associated with the operation and maintenance of the fueling stations results in a 160 job total. This number is consistent with the 240 jobs per MW installed Fuel Cell Capacity used by the State of Connecticut to estimate job growth from the implementation of fuel cell technology. Installing these hydrogen fueling stations creates 650 kW of “Fueling Capacity” in this case. Following Avāence’s business model these jobs will continue (and in fact increase) as Avāence begins to sell (and export) certified fueling stations based on the units installed under this funding.