

**Linde LLC comments to the California Energy Commission 2011-2012 Investment Plan
for the Alternative and Renewable Fuel and Vehicle Technology Program – 10-ALT-1**

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MAR 25 2011

Linde would like to commend the CEC for their efforts in supporting hydrogen fueling infrastructure with funding to ensure fueling capability is on the ground for drivers of fuel cell vehicles. We believe it is very important for the CEC to continue to provide funding for hydrogen fueling infrastructure on an annual basis to ensure continued industry confidence and enable the commercial release of large numbers of fuel cell vehicles in California in the 2015-2017 timeframe.

We believe it is important to appreciate that any fueling stations funded by the 2011-2012 investment plan will not likely be contracted until early 2013 which means the stations would not be fueling cars until 2014. These stations will be met with a large influx of fuel cell vehicles in 2015, only one year after start-up, and will need to be able to handle the fueling of many vehicles in short periods of time. From a practical perspective, high throughput, high performance stations must be in place for this commercial rollout of vehicles.

The industry will need private investors and interested gasoline retailers and wholesalers to invest in future stations. In addition, OEM's must be convinced the fueling infrastructure can truly handle the fueling of tens of thousands of cars in the 2015-2017 timeframe. To that end it is critically important that high performance, high throughput stations be operational no later than 2013-2014 to show these key stakeholders that these stations do indeed exist, that they can operate reliably and that a technical solution exists that can be economically viable.

Linde thinks it is appropriate to define a high throughput, high performance station as one that will many fuel cars back to back in 3 minutes without delay and fuel a population of hundreds of vehicles. These metrics will ensure reliable and fast fueling for a very large population of vehicles and, most importantly, attract drivers and provide the end customer with a positive fueling experience. Linde fueling technology will meet this specification even during extended rush hours.

The CEC's money will be well spent investing in these high throughput, high performance stations. First, these stations are of such high capacity they will be functional well beyond the initial rollout of FCV's in the 2015-2017 timeframe with little added investment – namely an additional dispenser. Second, it is a sound investment for the CEC. Since these stations can fuel a population of hundreds of vehicles and since they will provide the driver with reliable operation and service (3 minute fueling all the time), these stations will attract many more drivers than smaller stations and dispense many more kilograms of fuel over the initial three years of operation compared to a small station. Linde analysis shows the money invested by the CEC per kg dispensed on a Linde station is comparable to that provided by lower cost, small stations over a three year period and of significantly greater value over the lifetime of the equipment. CEC funding of these larger stations are an excellent short and long term investment for the state with the added performance benefits as described above.

Linde encourages the CEC invest in both lower throughput and higher throughput stations – let the market and customers determine what they want and then industry can respond by listening to the customer and meeting their needs.

Finally, Linde encourages the CEC to consider station capacity be calculated based on hourly throughput since cars do not fuel 24 hours per day. We recommend any future solicitation base station capacity on continuous hourly throughput since the vast majority of drivers will fuel during the two rush hours and it is imperative a station can meet this peak demand. With respect to calculating a stations daily capacity, Linde recommends consideration of an alternate method. Kilogram per day capacity could assume no more than 6 hours of fueling per day, with the assumption that 80% of the fueling takes place during the two 3 hour rush hours and the remaining 20% at other times during the day. This tends to mirror real world fueling than does 10 hour or 24 hour capacity calculations.