

**DECLARATION**  
**OF**  
**THE DEPARTMENT OF ENERGY OF THE UNITED STATES OF AMERICA**  
**AND**  
**THE MINISTRY OF TRADE, INDUSTRY AND ENERGY OF THE REPUBLIC OF KOREA**  
**OF COLLABORATIVE ACTIVITIES**  
**CONCERNING LIGHT-DUTY FUEL CELL ELECTRIC VEHICLE VALIDATION DATA**

The Department of Energy of the United States of America (DOE) and the Ministry of Trade, Industry and Energy (formerly, the Ministry of Knowledge Economy) of the Republic of Korea (MOTIE), hereinafter collectively the "Participants":

DESIRING to collaborate on fuel cell electric vehicle testing, data collection, and validation; and

ACTING in furtherance of the Implementing Arrangement between the Department of Energy of the United States of America and the Ministry of Knowledge Economy of the Republic of Korea for Cooperation in the Area of Clean Energy Research and Technology, signed October 11, 2011,

Are pursuing the following activities:

**1. Technical Scope of Work**

The goal of the activities to be performed under this collaboration is to collect, analyze, and validate performance data from light-duty hydrogen fuel cell electric vehicles (FCEV) operating in real-world environments. Feedback is to be provided to the Participants in hydrogen and fuel cell research and development (R&D) projects and industry partners to help determine what additional R&D is required to move the technology forward.

**2. Participating Organizations**

The collaborative activities are being performed by the following organizations:

- a. For DOE: Hyundai America Technical Center, Inc. (HATCI) and the National Renewable Energy Laboratory (NREL);

- b. For MOTIE: Hyundai Motor Group (HMG) and Korea Institute of Energy Technology Evaluation and Planning (KETEP) acting on behalf of MOTIE. KETEP is to fund, manage, and evaluate the research undertaken by the Korean Participants.

### **3. Implementation**

- a. Key Personnel

The principal investigators and other key points of contact are identified in Appendix 1 attached to this Declaration.

- b. Program Management and Communications

DOE is managing a cooperative agreement with HATCI (award #DE-EE0005970, through DOE's Fuel Cell Technologies Office), and MOTIE is collaborating with HMG, which is to manufacture advanced fuel cell electric fleet vehicles for testing and demonstration purposes in the United States. HMG is to develop new data logging systems to improve vehicle data collection, and provide vehicle spare parts and technical support. Subsequently, HMG is to utilize accumulated real-road vehicle data, such as performance and fuel cell durability, that may be used to help further R&D.

NREL is coordinating with HATCI to implement the secure transfer of vehicle data to NREL's secure data center (National Fuel Cell Test Evaluation Center), for approval of publicly released composite data products and for sharing the individual data product results (including only HMG's or HATCI's data) of the vehicle data analyses. Under the DOE cooperative agreement, HATCI and NREL may not communicate HMG's or HATCI's individual data product (IDP) results with any party that is not identified in NREL's secure data center protocol. Composite data products, which include other participating vehicle data providers, are to be shared with MOTIE, KETEP, and HATCI through a publicly accessible web-site or by written request once the information is approved for public dissemination by HMG, HATCI, and DOE. Any information regarding HATCI's cooperative agreement with DOE should be obtained directly from HATCI or with the permission of HATCI.

- c. Funding

DOE is providing funding (\$1,097,255) through its cooperative agreement (DE-EE0005970) with HATCI. Under this cooperative agreement, HATCI is required to provide cost share equal to or greater than 50% of the total allowable project costs as they are incurred within each budget period. The cooperative agreement is divided into two budget periods: total funding for budget period 1 is \$1,339,504; total funding for budget period 2 is \$855,005. The DOE share is \$669,752 for budget



period 1 and \$427,503 for budget period 2. In some circumstances, budget modifications may be made to increase or decrease the total project award based on mutual agreement on work-scope and schedule between DOE and HATCI. Projected levels of funding from DOE and HATCI under the cooperative agreement are shown in Appendix 2 attached to this Declaration.

MOTIE is providing KRW 1,536,000,000 funding to HMG. Projected levels of funding from MOTIE and HMG are shown in Appendix 3 attached to this Declaration.

All costs associated with the implementation of activities under this collaboration are to be the responsibility of the entity that incurs them. To the extent that HMG costs are allowable, allocable and reasonable to the cooperative agreement DE-EE0005970 between DOE and HATCI, they may be counted toward HATCI's 50% cost share requirements, following all applicable statutory and regulatory requirements.

#### 4. Period of Performance

- a. This collaboration is expected to continue for the duration of DOE's cooperative agreement DE-EE0005970. The first (current) budget period is from January 1, 2013, to December 31, 2015, and the second budget period is from January 1, 2016, to December 31, 2017. Go/No-Go decision criteria are to be used to determine whether the project continues into the second budget period. The DOE cooperative agreement may be extended or discontinued by written agreement of the parties thereto.

Signed in duplicate.

For the Department of Energy  
of the United States of America:



Date: December 24, 2013

Place: Washington

For the Ministry of Trade, Industry and  
Energy of the Republic of Korea:



Date: December 31, 2013

Place: Seoul

## Appendix 1

### Key Personnel

Republic of Korea	United States of America
Ministry of Trade, Industry and Energy	Department of Energy
Dae-Hwan Jung Deputy Director Energy Technology Division Ministry of Trade, Industry and Energy <a href="mailto:hanbitj@motie.go.kr">hanbitj@motie.go.kr</a> +82-2-2110-5692	Sunita Satyapal Director Fuel Cell Technologies Office Office of Energy Efficiency and Renewable Energy <a href="mailto:Sunita.Satyapal@ee.doe.gov">Sunita.Satyapal@ee.doe.gov</a> 202-586-2336
Korea Institute of Energy Technology Evaluation and Planning (KETEP)	Ronald C. Cherry Senior Policy Advisor Office of East Asian Affairs Office of Policy and International Affairs U.S. Department of Energy <a href="mailto:Ron.cherry@hq.doe.gov">Ron.cherry@hq.doe.gov</a> (202) 586-2285
Sungho Bae Head of Global Cooperation Division Office of Performance Diffusion Korea Institute of Energy Technology Evaluation and Planning <a href="mailto:shbae@ketep.re.kr">shbae@ketep.re.kr</a> 82-2-3469-8340	
Hyundai Motor Group	Hyundai America Technical Center, Inc
Sae Hoon Kim Research & Development Division Fuel Cell Vehicle Team2 General Manager <a href="mailto:saecheon@hyundai.com">saecheon@hyundai.com</a> 82-31-368-6354	Jerome Gregeois Powertrain Driveability & ECO Team Manager <a href="mailto:jgregeois@hatci.com">jgregeois@hatci.com</a> 909-993-5439
	John Juriga Director of Powertrain <a href="mailto:jjuriga@hatci.com">jjuriga@hatci.com</a>
	NREL
	Keith Wipke Laboratory Program Manager Fuel Cell and Hydrogen Technologies Program <a href="mailto:keith.wipke@nrel.gov">keith.wipke@nrel.gov</a>

## Appendix 2 Budget and Objectives for HATCI / DOE cooperative agreement

Applicant Name: Hyundai America Technical Center, Inc. Award Number: DE-EE0005970

### Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

#### Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Budget Period 1, Years 1-3	81.087			\$669,752	\$669,752	\$1,339,50
2. Budget Period 2, Years 4-5	81.087			\$427,503	\$427,503	\$855,00
3.						\$
4.						\$
5. Totals		\$0	\$0	\$1,097,255	\$1,097,255	\$2,194,51

#### Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	Budget Period 1, Years 1-3	Budget Period 2, Years 4-5			
a. Personnel	\$500,394	\$358,350			\$858,74
b. Fringe Benefits	\$117,109	\$89,502			\$206,61
c. Travel	\$24,000	\$16,000			\$40,00
d. Equipment	\$73,200	\$0			\$73,20
e. Supplies	\$204,000	\$136,000			\$340,00
f. Contractual	\$0	\$0			\$
g. Construction	\$0	\$0			\$
h. Other	\$238,140	\$133,380			\$371,52
i. Total Direct Charges (sum of 6a-6h)	\$1,156,843	\$733,232			\$1,890,07
j. Indirect Charges	\$182,661	\$121,774			\$304,43
k. Totals (sum of 6i-6j)	\$1,339,504	\$855,006			\$2,194,51
Program Income	\$0	\$0	\$0	\$0	\$

SF-424A (Rev. 4-92)  
Previous Edition Usable  
Pre  
scribed by OMB Circular A-102



## **Project Objectives:**

The Goal and Objective of this project is to demonstrate:

- The Hyundai Tucson Fuel Cell Electric Vehicles (FCEV's) reliability in real world applications and under "normal" customer usage in the Southern California geographic region.
- Increase our understanding of U.S. customer operation patterns and methods of operation. While demonstrating reliability, the Participants intend to:
- Collect data on the key operating systems of the vehicle to assess its production readiness and viability in this market.
- Utilize information gathered to continue the improvement of the vehicle operating systems and fuel cell stack reliability, as well as continue efforts to cost down the technology and enhance design for manufacturing efforts.
- Gather data to improve Powertrain performance and fuel efficiency.
- Provide operating, maintenance, safety, and cost data to the Hydrogen Secure Data Center (HSDC) at NREL.

## **Data Collection**

HATCI's planned data collection system is shown in Figure 1. Basic on-board vehicle data – including data about the vehicle's condition, Vehicle ID, ambient temperature, coolant temperature, stack power, vehicle velocity, vehicle odometer, and H<sub>2</sub> pressure – is sent continuously in real time via cellular (CDMA/GSM) transmission to HATCI's local server and is then to be transferred to the main server in the Republic of Korea. Raw vehicle data is sent via wireless LAN (Wi-Fi) to local servers in the U.S. and is transferred via Internet to HMG's server in the Republic of Korea. Data and report query access is available to HATCI and H M G engineers via the server data website. HATCI is to provide all program required data to DOE via e-mail or FTP transfer. As part of this program, HATCI would also submit dynamometer and track testing data. Dynamometer testing would occur every 15,000 miles at HATCI's Fuel Cell Facility in Chino, California. Track testing would occur every 30,000 miles at the California Proving Grounds (CPG), a 4,300-acre facility in the Mohave Desert just outside of California City.

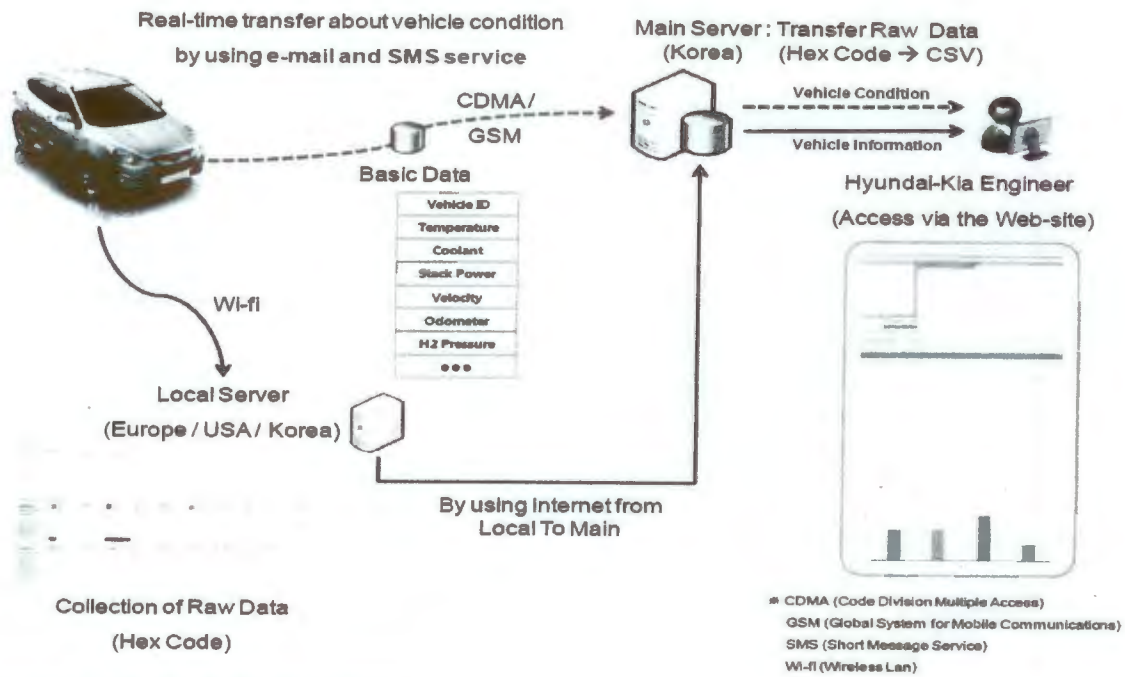


Figure 1- Data Collection System

### Appendix 3 Budget and Objectives for HMG / MOTIE

Project Title		Fuel Cell Vehicle Testing, Data Collection and Validation Fleet in North America			
Period of Performance		FROM: 01-12-2012 TO: 30-11-2015			
		Year 1	Year 2	Year 3	Sum
Project Period		01-12-2012 ~ 30-11-2013	01-12-2013 ~ 30-11-2014	01-12-2014 ~ 30-11-2015	01-12-2012 ~ 30-11-2015
Total Budget (in kind) (Unit: KRW 1000/US\$)	HMG	KRW 736,000,000 (368,000,000)	KRW 400,000,000 (200,000,000)	KRW 400,000,000 (200,000,000)	KRW 1,536,000,000 (768,000,000)
		- Manufacture of FCEV for demonstration in North America - Evaluation of FCEV performance - Establishment of Database System for FCEV operating data - development of vehicle data transfer and storage method.	- Manufacture of FCEV for demonstration in North America - Evaluation of FCEV performance - statistical analysis of collected data	- monitoring of FCEV operating in real roads and evaluation of durability  - monitoring of maintenance and repairs in the real condition Analysis of service intervals for the vehicle parts	