

**Written Statement of**

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**Before the**

**House Committee on Energy and Commerce**

**Subcommittee on Energy and Power**

**United States Congress**

**“Title II: 21<sup>st</sup> Century Workforce”**

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**University of Houston**

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Chairman Whitfield, Ranking Member Rush, Members of the Committee. My name is Ramanan Krishnamoorti and I am the Acting **Vice President and Vice Chancellor for Research and Technology Transfer and the Chief Energy Officer at the University of Houston**. The University of Houston is a leading Tier 1 public research university that offers undergraduate and graduate programs on campus and on-line to more than 41,000 students. The University of Houston is designated a Minority Serving Institution (MSI), a Hispanic Serving Institution (HSI) and was rated the second most racially/ethnically diverse university in the nation by U.S. News & World Report in 2010.

UH takes full advantage of our location in Houston, the energy capitol of the world, to offer undergraduate, graduate and certificate programs in all facets of the energy industry, with a major focus on training our students for jobs in the energy sector. As the Committee considers ways the federal government can foster education and training for energy and manufacturing jobs, I am pleased to speak with you today to share some of the innovative ways the University of Houston is working to train our workforce for high skilled jobs in the energy industry.

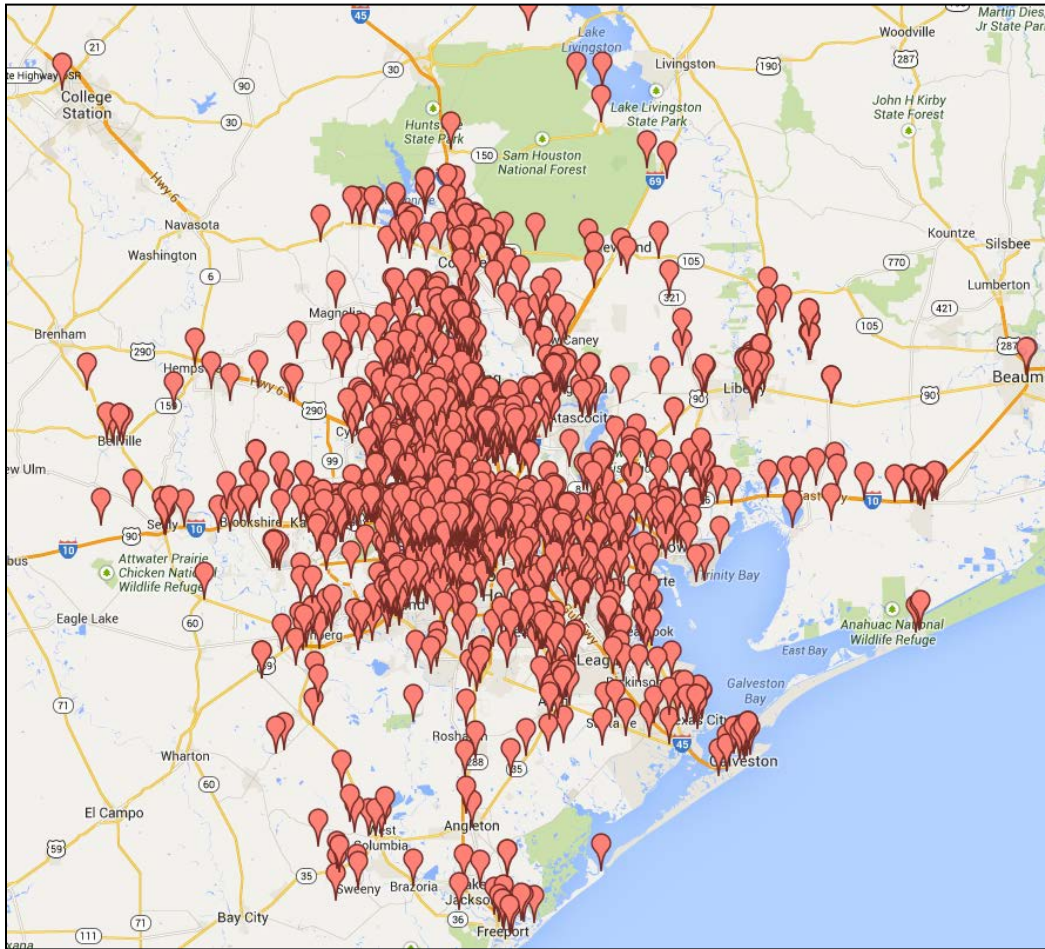
## **Background**

Energy is a dominant part of the economy in the greater Houston area – 50% of Houston’s employment is in the energy sector; 10% of Houston’s employment is specifically in oil and gas. Houston has 3,700+ energy related businesses in the MSA and they continue to add jobs – 36,500 jobs have been created to the energy exploration and oil field services; a 46.2% increase since 2010. Houston employs one third of the entire nation’s oil and gas extraction workers.<sup>1</sup>

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<sup>1</sup> Greater Houston Partnership, “Talking Points,” 2015, <[http://www.houston.org/pdf/research/quickview/Most\\_Current\\_Talking\\_Points.pdf](http://www.houston.org/pdf/research/quickview/Most_Current_Talking_Points.pdf)>.

## Energy Related Business in the Houston MSA



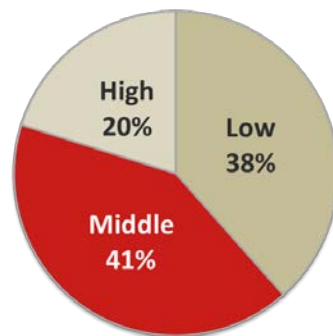
The recent price volatility and evolution of the types, quantities and geographical density of hydrocarbons and energy production over the last ten years has created a challenge in meeting the workforce demands of the energy industry. The energy industry is experiencing a massive misalignment of workforce needs and student education. It's a significant challenge for industry to recruit and retain a qualified, stable workforce.

The industry identifies a "skills gap" that exists between the skills that employers seek and the skills present in the workforce. The human resources consulting arm of Deloitte surveys employers annually and found that employers report that the gap has increased since

last year and that their own ability to address the issue has decreased.<sup>2</sup> Two dominant forces have been responsible for the “skills gap”: (i) Rapidly evolving technologies, and the consequent technological obsolescence coupled with the absence of dynamic training programs to close the gaps; and (ii) The crew change resulting from demographical shifts of workforce in the energy industry due to the retirement of baby boomers and the lack of stability of mid-career jobs resulting from price volatility.

Broadly, the Houston Metropolitan Statistical Area has 3.6 million jobs of which 1.4 million are in the middle skill sector.<sup>3</sup>

#### Distribution of Total Employment in Houston MSA by Broad Skill Level



A recent projection by the Greater Houston Partnership predicts that by 2017, there is likely to be a shortfall of 70,000 middle skill workers in Houston.<sup>4</sup> A separate projection indicates that the energy industry (upstream, midstream, downstream and utilities), which employs over 500,000 people in greater Houston, will have overall shortages of 20,000 middle skill and 10,000 highly skilled workers by 2020. Currently US universities graduate 1,000 – 1,200 petroleum engineers annually<sup>5</sup> and these represent only a small fraction of the needs of the energy industry nationally. There is a critical need to find ways to skill-up the mid-skill workers and retain the 35 to 50 year-old energy professionals in the industry.

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<sup>2</sup> Agarwal, Bersin, Pelster, Schwartz, “Global Human Capital Trends 2015,” 2015, pg 4  
<[http://d2mtr37y39tpbu.cloudfront.net/wp-content/uploads/2015/02/DUP\\_GlobalHumanCapitalTrends2015.pdf](http://d2mtr37y39tpbu.cloudfront.net/wp-content/uploads/2015/02/DUP_GlobalHumanCapitalTrends2015.pdf)>.

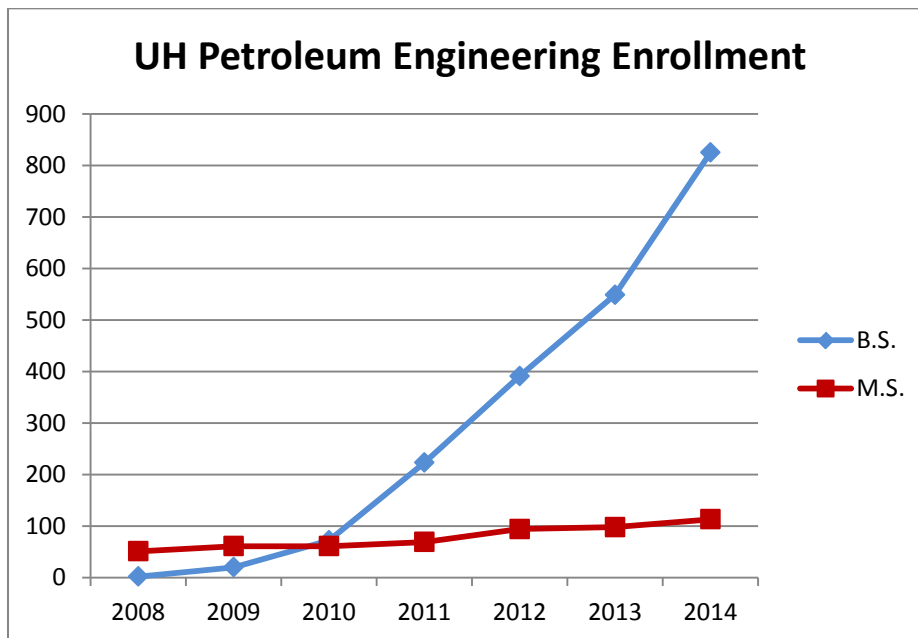
<sup>3</sup> EMSI Complete Employment – 2013.2; TIP Strategies

<sup>4</sup> EMSI Complete Employment, 2013.2, US Bureau of Labor Statistics, TIP Strategies, Inc.

<sup>5</sup> American Society for Engineering Education, “Engineering by the Numbers,” 2012-2013,  
[http://www.asee.org/papers-and-publications/publications/14\\_11-47.pdf](http://www.asee.org/papers-and-publications/publications/14_11-47.pdf).

## University of Houston Academic Programs

The University of Houston has over the last seven years embarked on a transformation to become the Energy University in research, technology transfer, and most importantly in student education. We have already developed successful programs at the undergraduate level—like Petroleum Engineering—and the graduate level—such as the nation’s first Subsea Engineering program. The undergraduate program in petroleum engineering, which started six years ago, has grown rapidly to enroll more than 877 undergraduate students and an additional 112 masters students for Spring 2015 and has a remarkable 35+% of female students in the program.



Our success is due in large part to partnering with industry, K-12 and community colleges.

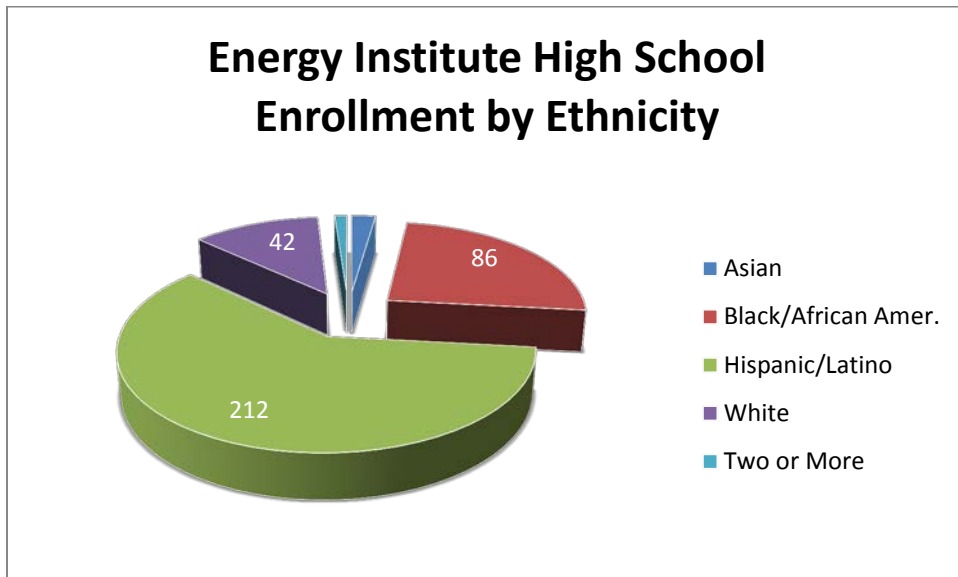
### Partnership with Industry

Through advisory boards and adjunct faculty, we developed strategies to address actual workforce realities, to find “quick wins” for continued business engagement and to recruit and retain women and minority students. President Renu Khator instituted the university’s Energy

Advisory Board in 2011 and it is currently made up of 25 industry leaders who provide strategic guidance for UH's energy initiative. Further, they staff advisory sub-committees to help the university develop actionable plans in the areas of education, research and technology incubation. The input they provided about the industry's workforce needs led to the creation and development of the Upstream Energy Safety Certificate Program. Their desire for equipment and technology testing directed our pursuit of the recently awarded Texas Center of Excellence.

### Partnership with K-12

We have partnered with an innovative school in Houston, the Energy Institute High School (EIHS), a one-of-a-kind magnet school in the Houston Independent School District (HISD) focused on the pursuit of knowledge in energy. Located less than a mile from UH, this school currently offers a unique education curriculum currently at the ninth and tenth grade levels (and expanding over the next two years to all high school grades) and a student body that is predominantly economically disadvantaged (221 students out of 352 are classified as economically disadvantaged), and also diverse - 27% of the students are female, and 60% are Hispanic/Latino and 24% are Black/African American.



UH has facilitated summer bridge camps for incoming Energy Institute High School freshman, connected UH graduate students with EIHS students needing tutoring, and, along

with the Independent Petroleum Association of America/Petroleum Equipment & Services Association (IPAA/PESA) Petroleum Academies Program, hosted the PetroChallenge at UH for EIHS students and other (HISD) schools. UH recognizes the responsibility to foster a solid foundation for the next generation of college students/energy workers.

### **Partnership with Community Colleges**

A key feature of our partnership with community colleges is a focus on upskilling through certificates and stackable credentials for students who have completed an Associate's degree. UH partners with nine community colleges in the Greater Houston area and a pool of 60+ community colleges in the Gulf region.

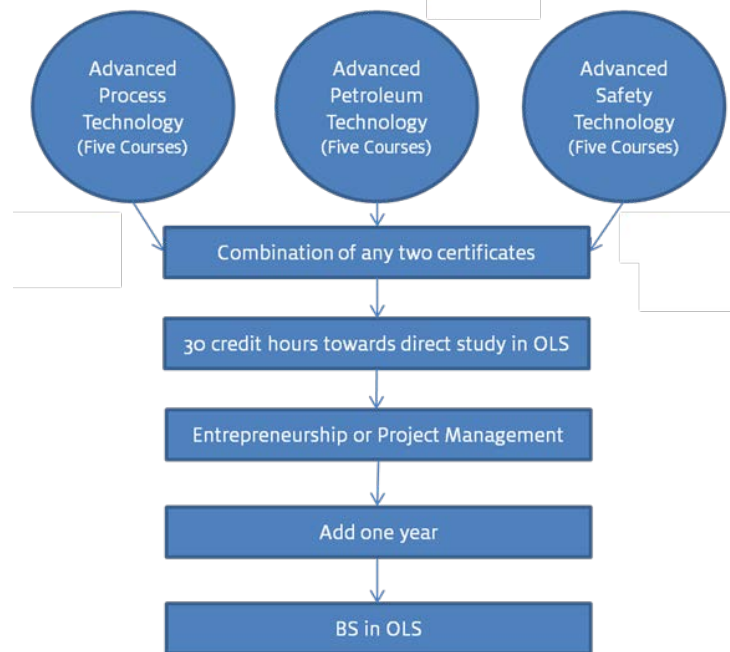
### **Stackable Certificates**

Stackable credentials provide two necessary ingredients to successfully address workforce needs: 1) Speed - It accelerates skill enhancement of workers and their re-deployment in areas of critical need; and 2) Volume - The stackable format provides rapid portability and scalability of the program. Basically, it produces more high-skilled workers in less time.

The University of Houston's innovation with the stackable credentials model is the application to the energy industry. No one else has adapted stackable credentials for the workforce we're targeting, and we believe that this can serve as a model scalable solution that can impact the industry broadly and quickly up-skill energy workers to earn undergraduate degrees.

The University of Houston along with consortium partners of Houston Community College, Lee College, Lone Star Community College and San Jacinto College is developing training and educational programs to accelerate energy related workforce development in critical areas for the state of Texas. We will offer three undergraduate certificate programs in advanced petroleum technology, advanced process technology and advanced safety technology; and stackable credentials for students who successfully complete any two of these certificates towards an accelerated pathway (*i.e.*, less than one additional year) towards a BS degree in Organizational Leadership and Supervision program.

## Taking Students from Certificate to BS Degree in Organizational Leadership and Supervision<sup>6</sup>



Key to the success of the partnership with community colleges is 1) the collaboration and articulation between consortium partners to seamlessly develop and deliver the certificate programs and transfer credits, and 2) a competency based survey to assess the effectiveness of the program.

The introductory courses for each certificate will be offered at the participating community colleges and the advanced courses will be offered at the University of Houston. Once developed and assessed, the proposed three certificate programs will be available for adoption with interested institutions across Texas.

University of Houston is strategically located in Houston to provide the workforce development opportunities that are essential to the Texas economy. The greater Houston area offers abundant employment opportunities in petroleum, chemical, petrochemical, power plants, refineries, food processing, and pharmaceuticals. There are more than 60 community

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<sup>6</sup> This pathway allows students to stack certificate credentials to lead to a B.S. degree in Organizational Leadership and Supervision. This program is competency-based and requires: 1) the completion of two out of three certificate programs either in advanced petroleum technology, advanced chemical technology or advanced safety technology; and 2) plus the completion of two certificate programs in project management, and organizational leadership and supervision.



colleges in Texas that offer associate degrees in either petroleum technology or process technology or safety technology. The majority of the graduates from these programs do not have an opportunity to pursue a higher degree within their disciplines.

To launch this program, we thought creatively and strategically about which population to target. One of the most significant needs in the Greater Houston area is in the skilling up of mid-skill workers in the process technology (downstream energy) industry where over the next three years over \$120 B are expected to be spent to grow the infrastructure and adapt to the cheap availability of unconventional oil and gas. This first cohort in the Advanced Process Technology certificate in the Fall of 2015 will demonstrate the scalability and portability of our upskilling program and will let the Energy University build on the significant achievement of the entire education pipeline including K-12 and Community College education in meeting the energy industry's needs rapidly.

The Committee's focus on workforce development in the energy sector is well placed. We are proud of the initiatives the University of Houston has undertaken in our region and are encouraged by the Committee's efforts to consider ways to scale workforce development programs in the energy sector on a national basis. I thank you for the opportunity to provide testimony today and look forward to answering your questions.