

WOMEN IN MANUFACTURING

HEARING

BEFORE THE

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

ONE HUNDRED THIRTEENTH CONGRESS

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WOMEN IN MANUFACTURING

WEDNESDAY, MAY 15, 2013

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, DC.

The committee met, pursuant to call, at 10:03 a.m. in Room 216 of the Hart Senate Office Building, the Honorable Amy Klobuchar, Vice Chair, presiding, and the Honorable Kevin Brady, Chair.

Representatives present: Brady, Paulsen, Maloney, and Delaney.

Senators present: Klobuchar.

Staff present: Conor Carroll, Gail Cohen, Sarah Elkins, Christina Forsberg, Connie Foster, Niles Godes, Colleen Healy, and Robert O'Quinn.

OPENING STATEMENT OF HON. AMY KLOBUCHAR, VICE CHAIR, A U.S. SENATOR FROM MINNESOTA

Vice Chair Klobuchar. Okay. We have some very friendly witnesses, which is always good to hear. I love this. This is what happens when we have women witnesses at a hearing.

So we are going to call this hearing to order. I want to thank everyone for being here this morning to have this important conversation on the role of women in manufacturing, and to discuss the ways that women can play an even greater role.

We are going to be looking at manufacturing's impact on the economy, at the challenges facing manufacturers, and in states like Congressman Paulsen and I have in the State of Minnesota where we have a 5.4 percent unemployment rate, as Ms. Miller knows, we are very much focused on how we can get more people into manufacturing. And the fact that we have a smaller percentage of women in manufacturing means that this is a great recruiting group where we can try to talk about how we encourage them to go into manufacturing.

We have with us, first of all, Ms. Jennifer McNelly, who is the President of the Manufacturing Institute, which is the nonprofit affiliate of the National Association of Manufacturers. She has led the development of the Manufacturing Skills Certification System which certifies a set of nationally portable industry-recognized manufacturing skills.

Ms. Darlene Miller is the President and CEO of Permac Industries in Burnsville, Minnesota. Permac is a precision machining company that custom-manufactures parts for customers around the globe in industries including aerospace, medical technology, and transportation.

And then finally, Mrs. Amy Jolley is the Vice President of Tax at Noble Energy, an exploration and production company with domestic and international operations. And she is responsible for all of the company's global tax matters.

I think we all know that for decades manufacturing has been a pathway to the middle class for millions of families. It remains central to the U.S. economy today, making up about one-eighth of GDP. And manufacturing is also a major driver of innovation, accounting for 70 percent of the research and development carried out by U.S. industry, and generating 90 percent of patents. In fact, I was just talking to the CEO of 3M last evening. They are adding a number of jobs for research and development in our State with an Innovation Center. And of course they make the Post-It Note, and we like to say we have everything from the Pacemaker to the Post-It Note. But it has all been about manufacturing.

So what has been happening? Well I can tell you in my State a recent poll of manufacturing companies, 60 percent of respondents said it was hard for them to find workers with the right skills. That is up from 40 percent in 2010.

We have issues with welders. We have issues with all kinds of robotics jobs, things like that. And we see women as integral to the solution.

Women are underrepresented in the manufacturing workforce. They are losing ground. Women's share of manufacturing employment has been falling steadily since 1990, and is now at the lowest level since 1971. Women make up just 27 percent of the manufacturing workforce.

In order to change that direction, and in order to help manufacturers meet their hiring needs, we need to identify new ways for women to be exposed to, trained for, and participate in future opportunities in manufacturing.

The first of course is STEM education for boys and girls, and making sure that they are getting those skills. Just yesterday Senator Hatch and I got our amendment on the immigration bill which increases the funding for STEM education by adding a fee to the visa fees, something the business community believes is very important.

Making sure that community colleges play a key role here is also very important, as we look at how kids in high school and in community college are getting the skills that they need.

Addressing the perception challenge to manufacturing. I can't tell you how many—and Ms. Miller can probably talk about this—how many people on the factory floors, the usually male foremen, have said to me—pulled me aside and said: We need to get more women here. We don't have enough people to fill the jobs.

I remember at one plant when it was 10 degrees, I said to them: Have you considered heat?

[Laughter.]

And he goes, well, you know, I don't know; I haven't thought of that; everyone's fine.

When I got home, I put on my Facebook Page the company that I visited that day, and two people wrote in: My brother worked there, but it got too cold and he left.

[Laughter.]

We have already made a lot of steps in the right direction to make sure people know this isn't your grandpa's factory floor anymore. It is cleaner. It is safer. The skills are higher. And we have to bring that message home to girls all around the country.

I want to quickly recognize the leadership of Congresswoman Carolyn Maloney of New York on women's employment issues, and I would like to recognize her just to speak here, yielding a minute of my time for her remarks.

[The prepared statement of Vice Chair Klobuchar appears in the Submissions for the Record on page 24.]

[The report titled "Women in Manufacturing" submitted by Vice Chair Klobuchar appears in the Submissions for the Record on page 26.]

OPENING STATEMENT OF HON. CAROLYN B. MALONEY, A U.S. REPRESENTATIVE FROM NEW YORK

Representative Maloney. Well thank you, Madam Chair, and congratulations on your leadership on this issue.

The JEC has historically played an important role in highlighting how women have fared in earnings, education, and jobs. In 1973 the JEC held an historical series of hearings entitled "The Economic Problems of Women", and in 1983 Senator Olympia Snow held a number of hearings looking at the changing role of women in the workforce.

When I concluded my time as Chair of the JEC at the end of 2010, I issued a report, "Invest In Women, Invest In America: A Comprehensive Review of Women in The U.S. Economy," to help policymakers better understand how women can drive economic growth.

Your hearing is tremendously important. It points out that we are gaining manufacturing jobs, which is great, over 530,000 new jobs in manufacturing; yet, we are not sharing the prosperity. We are growing the disparity because during that time your report shows that 28,000 manufacturing jobs were lost to women.

So we need to address how this can happen. I think this is an important hearing on our economy, and also in advancing the opportunities for women in the workforce.

So thank you very much, Madam Chair, or Vice Chair, for holding this hearing and I am delighted to be here supporting you.

Vice Chair Klobuchar. Well thank you so much, and thanks for your leadership. I know Chairman Brady would like to speak, as well, and has been a leader in this area.

OPENING STATEMENT OF HON. KEVIN BRADY, CHAIRMAN, A U.S. REPRESENTATIVE FROM TEXAS

Chairman Brady. Well I would like to thank Vice Chair Klobuchar for choosing the topic of today's hearing, "Women in Manufacturing."

As we have discussed with particular focus in this Congress, the United States is suffering from an economic growth gap, and manufacturing is no exception. This recovery remains the weakest since World War II. We still have about \$1.2 trillion less in real GDP, and about 4.1 million fewer private-sector jobs than in an average post-war recovery.

Every Member of Congress agrees on the importance of manufacturing. Last year, manufacturing contributed \$1.87 trillion to the economy. In April of last year, 12 million Americans were directly employed in the manufacturing industry. And according to the National Association of Manufacturers, taken alone U.S. manufacturing would be the 10th largest economy in the world.

After rising for several decades, the percent of women employed in manufacturing peaked at 32.3 percent in the early 1990s. The percentage of women employed in manufacturing has subsequently declined to 27.3 percent.

Notably, this decline has been seen for both genders. Manufacturing jobs for women have declined to just 5 percent of the total nonfarm payrolls for women, and to a mere 6 percent of the same payrolls for men.

In context of the economy at large, manufacturing has been shrinking as a portion of the economy both in terms of GDP and employment, and yet labor productivity in this industry has outpaced the rest of the economy.

American manufacturers are the most productive in the world, far surpassing the worker productivity of any other major manufacturing economy, leading to higher wages and higher living standards. Manufacturers in the United States, as Senator Klobuchar said, perform two-thirds of all private-sector R&D in the Nation, driving more innovation than any other sector.

So why has the percentage of women employed in manufacturing declined? Is this a function of the changing composition of goods manufactured in the United States? Or a mismatch in skills versus available jobs? Or other factors? And what role should the Federal Government play in addressing these answers?

Going forward, most of manufacturing jobs require advanced skills and higher education. Between 2000 and 2011, manufacturing employment has increased by more than 10 percent among workers with more than a bachelor's degree. This compares to the approximate 25 percent decline in employment among manufacturing workers overall.

Women are indeed surpassing men in attaining additional skills and post-secondary education and beyond. The gender gap in education has closed since 2000 in the manufacturing workforce, and as of last year 28 percent of women in manufacturing hold a four-year college degree or higher, compared to 29 percent for men.

However, women remain currently underrepresented in science, technology, engineering, and mathematics, representing 46.5 percent of the total employed in these fields. A study by the American Association of University Women found that most women in STEM fields are biological scientists, chemists, and environmental scientists, rather than in other STEM fields that directly relate to most forms of manufacturing.

Over time, increasing the number of women receiving degrees in STEM fields that directly relate to manufacturing will increase the number of women employed in manufacturing. We should remove any obstacles that discourage women from majoring as undergraduates and seeking advance degrees in these fields.

Furthermore, many high schools, universities, and manufacturing firms are proactively encouraging women to pursue edu-

cation and training in manufacturing with high school partnerships and internships, reaching out to women on campus, and focusing on career training for women.

Final point: Critical to employing more women in manufacturing is ensuring that the United States remains an attractive place for manufacturers to do business.

The keys to a strong manufacturing sector include pro-growth tax reform; balanced regulation; a sound dollar; abundant, affordable energy distributed across the country, with the help of the Keystone XL and other pipelines; and a reduction of health care costs that impede employers from hiring.

I hope the witnesses today can shed light on the trends of women in manufacturing going forward, what's been working best to attract women to high-skill manufacturing and other STEM fields, as well as broadly identifying best practices for the continued success of the manufacturing industry in America.

Ms. Jennifer McNelly, President of the Manufacturing Institute, will tell us about the initiatives that her organization is undertaking to help women pursue careers in manufacturing.

Ms. Darlene Miller, the President and CEO of Permac, will discuss "Right Skills Now," a cooperative program with community colleges to credential women with skills needed by manufacturers. Also, she is part of the Minnesota mafia taking over the JEC these days.

[Laughter.]

Finally, Mrs. Amy Jolley, Vice President of Tax for Noble Energy, who is from my home State of Texas—

[Murmurs in the background.]

Thank you.

[Laughter.]

I will pause for applause—will inform us of the opportunities for women in the booming energy production manufacturing sector.

I look forward to hearing the testimony of all the witnesses. I yield back.

[The prepared statement of Chairman Brady appears in the Submissions for the Record on page 33.]

Vice Chair Klobuchar. Very good. Well thank you very much, Mr. Chairman.

Ms. McNelly, why don't you begin.

**STATEMENT OF MS. JENNIFER M. McNELLY, PRESIDENT,
MANUFACTURING INSTITUTE, WASHINGTON, DC**

Ms. McNelly. Chairman Brady, Vice Chairman Klobuchar, and distinguished Members of the Committee:

Thank you for the opportunity to appear today on behalf of the Manufacturing Institute and Women in Manufacturing. I am Jennifer McNelly, President of the Institute, and we are the authority on the attraction, qualification, and development of worldclass talent.

Vice Chairman Klobuchar, you noted in your opening remarks the traditional perspective of manufacturing, and I like to say historically we have been viewed as the 3Ds: Dark, Dirty, and Dangerous. And when we think about advanced manufacturing in this

economy, and the steps that we have made forward in pulling us out of the recession.

I like to think about the three Ps that make us competitive. It is the Processes in our facilities that allow for innovation. It is the Products that we create. And most important, it is the People, the individuals that walk into our facilities every single day.

In a survey of over 1,000 manufacturers from Deloitte and the Manufacturing Institute, we found that over 80 percent of our Nation's manufacturers could not find qualified, skilled workers.

Manufacturing companies cannot fill as many as 600,000 open jobs today. There is one obvious source of human capital that the manufacturing industry has not fully tapped: women.

Across the manufacturing sector, women are underrepresented in the workforce. While women represent nearly half of the total U.S. labor workforce, they comprise about a quarter of durable goods manufacturing.

In a 2012 report from Deloitte and the Manufacturing Institute, we set about to understand why manufacturing is not attracting, retaining, and advancing their fair share of women. The survey was conducted with 600 women across manufacturing, including individual interviews.

Today I would like to highlight two of the most consistent responses from women that we interviewed: Sponsorship and Personal Development.

Sponsorship: Women who were successful in manufacturing often looked at their career choices and credited a sponsor undertaking responsibility for their development and professional progression. Sponsorship extends beyond mentoring and coaching to being a vocal advocate.

Recent research shows that individuals who have active support from sponsors are more likely to advance in their careers. Sponsorship can have a 30 percent benefit in terms of stretch assignments, promotions, and pay increases.

To encourage this goal, this year the Manufacturing Institute sponsored the First Annual Science, Technology, Engineering and Production Awards, or the STEP Ahead Initiative.

We celebrated and recognized 122 women from the front lines to the C-suite for their contribution to the competitiveness of their company and manufacturing in this economy, women who have demonstrated exceptional leadership in their careers.

We were able to celebrate exciting careers and showcase the impact that women have to our industry. The honorees are role models to empower today's current manufacturing leaders, and most important inspire the next generation.

We have one of our STEP honorees here with us today, Darlene Miller. All of our honorees have contributed to their company's success and the competitiveness of manufacturing in this country.

For example, Natalie Genova, Senior Project Manager, Integrated Supply Chain at Honeywell International. Natalie created a best-in-class onboarding training and leadership program for Honeywell. Natalie frequently attests her success to the importance of a sponsor and her own relationship with her sponsor, DonnaLee Scaggs. The impact this relationship had on Natalie has in fact turned her into a sponsor and mentor herself.

The second is Promoting Personal Development. In addition to powerful mentors and role models, women also cited professional development as a priority for success. Successful manufacturing organizations today provide their workforce talent with a clear understanding of the behaviors, capabilities, and expectations required to advance, and help individuals build out an experiential development plan. This includes identifying the challenging assignments, roles and experiences that help close that gap. A critical component of development is enhancing skills and building individual value in a company.

To that end, the Manufacturing Institute identified a series of nationally portable, industry-recognized credentials specifically to help grow workers in the manufacturing economy. In fact, one of our STEP Honorees is one of the most certified welders in industry.

Karen Gilgenbach, Weld Process Specialist for Airgas in Milwaukee, Wisconsin, is a Certified Welding Supervisor and a Certified Robotic Arc Welding Technician, both offered through the American Welding Society. Karen pursued additional training and education to achieve these certifications and increase her skill set. Much of this training can in fact be done in our Nation's community and technical colleges.

For many years, post-secondary success was defined as a four-year degree, whereas a valid, industry-based certification can provide the knowledge, skills, and abilities for a solid, middle-class family and a lifestyle. In conclusion, manufacturers across the country are beginning to realize that women are an untapped resource. Retaining, developing, and advancing these skills can be a challenge in a traditionally non-female environment. Our research shows that identifying sponsors and clear career pathways supports this effort.

I hope that we can work together in the future to promote these goals. Thank you for the opportunity to testify, and I look forward to working with you to build the next-generation manufacturing workforce.

[The prepared statement of Jennifer M. McNelly appears in the Submissions for the Record on page 34.]

Vice Chair Klobuchar. Very good. And thank you for the work you are doing nationally. It is really important. Thank you.

Ms. Miller.

**STATEMENT OF MS. DARLENE MILLER, PRESIDENT AND CEO,
PERMAC INDUSTRIES, BURNSVILLE, MN**

Ms. Miller. Thank you, Congressman Brady, and Senator Klobuchar, for inviting me here today and to share my views on manufacturing and especially the importance of women in manufacturing.

My personal story comes from owning a precision machining company since 1994. I actually started there in 1992. Manufacturing has been great, rewarding, and exciting for me. And as Senator Klobuchar mentioned, we make really cool products. And my company does have heat, and air conditioning, and is clean.

When I started, we had 7 people, about 7,000 square feet, and about \$700,000 in sales. Today, we have 34 people, about 34,000 square feet, and almost \$5 million in sales.

We believe a really good mix of men and women are necessary in our company to utilize everyone's skill set so that the maximum—can be achieved. Plus, we do not want to leave any talent source untapped.

We at Permac have had difficulty hiring people for the last 21 years that I have been there. It doesn't matter if it's a CNC machine programmer, it's a quality tech, or whatever position we have in manufacturing—and there are many—we have always had to search and search.

I have actually had to go two years looking for a CNC Swiss Programmer before we found a person who was skilled and trained to do that position. And unfortunately, this is something my colleagues and I have experienced continuously. We have job openings that go for months unfulfilled, which really adversely affects our ability to grow and manufacture more products.

As Jennifer mentioned, I was the recipient of the Women In Manufacturing Award, and we have also been fortunate to win some other awards such as the SBA Small Business Person of The Year, and the U.S. Chamber of Commerce Small Business of the Year for the entire U.S. And I think, due to these, I was given the honor of being asked to serve on the President's Council for Jobs and Competitiveness.

And then I was asked to co-chair the High Tech Education Committee. Well, I could finally do something and make a change for our industry. So along with NAM, and NIMS, and ACT, and two colleges in Minnesota, we developed a program called "Right Skills Now." Very rightly named.

It is a 24-week, fast-track, stackable credentialed program with 16 weeks of classroom and lab, and 8 weeks paid internship by the companies.

This is for men and for women. This is for 18-year-olds. This is for 50-year-olds, people who are recareering, people who lost their positions, people who left college, people who are graduating from high school. And I am really proud to say this program is expanding.

We are in approximately 30 schools at this point, and we just started it, launched it in October of 2011. And RSN is in 8 different states. So it is progressing very nicely and we are getting women involved in this program.

From this program, we also developed another one called "Get Skills to Work," which is for the Military and their families. That started in Ohio this January, and is going to roll out in 9 other states this year. It is a direct offshoot of "Right Skills Now."

It is just amazing that we can use this program to make such a huge difference in people's lives, and to show them what manufacturing is all about—especially to women.

Most of these men and women really have no concept of what manufacturing is. They have no idea, other than there are job openings. And as Jennifer said, 600,000 job openings today in manufacturing.

As a woman leader in manufacturing, I feel it is very important and I have a passion to encourage other women to get into this industry. I recently spoke at a school in Wisconsin. It was for high school seniors and there were many girls in the audience. I ex-

plained to them how women can get into manufacturing in all different levels.

And I told them we females actually have an advantage in our industry. We think differently. We think critically. And our asking, our asking why leads to improvements and efficiencies in our processes. And our attention to detail helps minimize mistakes. And our passion helps keep everyone motivated and working towards the same goal.

And as Jennifer stated, I also explained our plants are not dark, dirty, and dangerous, as everyone thinks they are. It is really exciting to know that we now have more women graduating from colleges than our male counterparts, but we need to start earlier. We need the government's help, and we need the schools' help to let them know about the STEM careers.

I also told the story of when I took ownership of my company and the Quality Director at the time said, "Well, I'm going to leave this company because no woman could survive in manufacturing running a company. This is a man's world."

Well, I guess, I proved him wrong.

I also personally became involved in a program called "Hope For Tomorrow." It is a mentoring program for young women, and we are now in 13 schools. And again, it is a program to teach young women and girls to know that their journey is what they make of it; that they in fact can get into any career they choose.

One of the girls I mentored, I took on a field trip to a college. She didn't want to go. She only went because she did it for me, as her mentor. She said, "in our culture, we get married after high school and we have babies, and I'm not going to college."

I just begged and begged her to go. So finally she went for me. On the way back, sitting in the bus, she stared straight ahead and she said, "I can do this. I can go to college. And I am."

What a difference we women can make for other girls out there in the world. So my goal is to continue to be a mentor, to continue to push education: especially stackable, credentialed education, and to get more and more for girls and women into this industry. It only takes one person to make that difference, and I pledge I will continue to do so.

I am happy to be here today, and thank you for listening.

[The prepared statement of Darlene Miller appears in the Submissions for the Record on page 35.]

Vice Chair Klobuchar. Thank you very, very much. I appreciate that testimony.

Mrs. Jolley.

**STATEMENT OF MRS. AMY JOLLEY, VICE PRESIDENT-TAX,
NOBLE ENERGY, INC., HOUSTON, TX**

Mrs. Jolley. Good morning, Chairman Brady, Vice Chair, Ms. Klobuchar, thank you for inviting me here today.

I am Amy Jolley with Noble Energy. Noble Energy is a Houston-based independent oil and natural gas exploration and production company, with approximately \$20 billion in market cap. We have about 2,500 employees.

In 2013, our capital spending program is expected to be about \$4 billion, nearly two-thirds of which will be invested in the United

States in our three primary domestic areas: Colorado, the Marcellus Shale of West Virginia and Pennsylvania; and Deep Water Gulf of Mexico.

I would like to speak to a couple of points today: The similarities and overlap between the manufacturing and the exploration and production energy sectors; and the challenges we all face with respect to attracting and retaining top talent, particularly with respect to women.

You may be curious about the connection of the upstream oil and gas industry with the classic manufacturing model. We don't necessarily convert raw materials into finished goods, but I previously worked for an independent power producer, as well as a global plastics and chemical manufacturer, each for several years, and have noted many similarities in terms of the challenges facing those industries in the financial, operational, and human resources areas.

To access onshore hydrocarbons, we frequently follow manufacturing concepts to drill and complete an increasing number of wells. As manufacturing processes become more homogenous, safety performance improves, efficiencies increase, and costs become standardized. In the upstream oil and gas business, we try and capture those same economic benefits.

We have research and development, which is comparable to seismic data and drilling, and we have the same considerations with respect to supply chain, inventory management, logistics, even marketing.

So, for example, we purchase and store huge amounts of pipe, casing, tubing, for our Gulf of Mexico, Colorado, and Pennsylvania operations. The oil and gas field manufacturing process itself consists of installation, development, and production.

We face the same challenges as traditional manufacturing in recruiting, hiring, and retaining highly skilled employees needed to run cost-efficient businesses. Noble is growing rapidly. Of our 2,500 employees, 400 were added in 2012 alone, and we expect similar growth in 2013.

We are hiring both experienced individuals and new collegiate and high school graduates throughout multiple disciplines: technical, operational, information technology, financial, and marketing. We are committed to attracting the highest level of talent in the science, technology, engineering, and mathematics fields to maintain and improve our success.

This means hiring various types of engineers: petroleum, mechanical, reservoir, and geoscientists, geophysicists, geologists, petrophysicists, oil and gas economists, and land administrators.

To further ensure enterprise-wide success, that same caliber of employee must be in place in the support functions required to run a successful business: legal, finance, information technology. We also need field and well operators.

The number and percentage of females in managerial, professional, and executive roles has been increasing at Noble Energy over the past few years. Much can be attributed to the larger number of females enrolled in the technical disciplines at the universities and colleges where we recruit.

As Noble Energy continues its growth, it will continue to focus on ensuring that the critical-level talent is met regardless of gender. But as the number of females with technical degrees continues to increase, we will have an inherent increase in the number of females in those roles within the company.

We tend to recruit at a small number of core schools, but we are seeing a big shift in the number of female graduates within the technical, geoscience, and engineering disciplines.

Noble Energy is very bimodal. And by that, I mean we have a large number of employees who are either in the first few years of their career, or in the last few years of their career. When we compare those two groups, there is a significant difference between the gender and ethnic diversity in that experienced group nearing retirement and our new employees.

As an example, our summer interns are starting to arrive for work this summer. This week's group of geoscience interns consisted of two-thirds females, and we are really excited about that.

As I think of my own role, which is financial, in the company, I realize that 15 or 20 years ago it would have been very unlikely for a female to hold this position. That being said, last week I attended a Houston-area Chief Tax Officers Forum, and of the attendees, females held the top tax position within approximately 25 percent of Houston-area companies.

Just a few years ago, three or four, that number was in the 10 percent range. So you can see a shift within the Houston energy corridor. For me, the key to increasing the gender mix across the board in the manufacturing and ENP sectors is to actively inform students at a younger and younger age to take advantage of the great employment opportunities that we have.

I grew up in rural Iowa. My own parents led me to believe I could do anything I wanted. But I don't think I even knew what an engineer was, let alone the difference between a chemical, a petroleum, or a mechanical engineer. That was an Internet age ago. There is a lot more access to information out there. But you have got to have people. You've got to have in K through 12 show and tell, job fairs, just get out in front of there and tell people what they have.

I love Ms. McNelly's and Ms. Miller's references to advocacy. We are involved in a couple of mentor and advocacy programs within Noble where we are connected with, someone who is a new hire coming into Noble. And it is just exciting to see the number of geoscientists—female geoscientists coming in, being excited about their job. But they chose that in college. They need to know at a younger and younger age what opportunities are out there.

So having companies actively participating in educational outreach can demonstrate the range of careers and options available so kids can pursue targeted educational opportunities.

The more that we can get in front of them, the more that we can show how they can bring productivity, economic success to themselves, their families, and employers in the U.S.

I am the mom of two young kids, 5 and 3. I want them to both understand the range of opportunities is nearly limitless, but also to provide them concrete examples of what their choices might be with the talents they have.

That concludes my remarks. Thank you again for asking me to participate.

[The prepared statement of Amy Jolley appears in the Submissions for the Record on page 37.]

Vice Chair Klobuchar. Well thank you, all of you. And thank you for the passion you bring to this.

I am going to do my questions, and then Chairman Brady will be taking over. I think Representative Maloney and Representative Paulsen can stay, because we have seven votes that just got called right now in the Senate.

But I wanted to, first of all, mention to Mrs. Jolley at the end there, I actually went with Senator Hoeven over to North Dakota to Williston and saw the incredible work going on. And one of our focuses, in addition to talking about some of the infrastructure they needed there, was also to talk about women, and that they needed more women there. And the Mayor asked me to say that they needed more women to move there.

[Laughter.]

So I was just remembering that rather hilarious moment. And there was a woman geoscientist who was incredible.

But I did just want to start with you, Ms. McNelly, and ask you about just how you see this in terms of you referenced the changing factory floors, and it is no longer dirty, dark, and dangerous. But what are the new needs? And what kind of jobs could women look for if they went into this field?

Ms. McNelly. That is a great question, and I will come back to product, process, and people.

In the end, we actually have seen a skill increase in the requirements for individuals in the manufacturing economy, skills grounded in science, technology, engineering, and math, much of the STEM skills that we have talked about.

But more important, as I think of the leadership role that women play in manufacturing today, manufacturing today really operates in a team-based environment. Its focus is in the diversity of our individuals with different perspectives that creates the next generation innovation. So individuals not just with strong STEM skills, but with leadership skills, with critical thinking, and in fact with the ability to operate in a team environment.

And that is really important to manufacturing today, because innovation often happens at the front lines. And increasing the diversity of our workforce in fact increases the innovation in our workforce. So there are great opportunities for women with strong technical skills, as well as women with good critical thinking, the ability to operate on a team, and the ability to lead.

Vice Chair Klobuchar. Very good. I don't know if you have read that Lean In book by Sheryl Sandberg. I just guessed you did, Ms. Miller.

Ms. Miller. I have. And I gave it to all the women on my staff.

Vice Chair Klobuchar. All right. Good. So anyway, she points out in this book the numbers, and I was just seeing the numbers for manufacturing where women hold only 17 percent of board seats, 12 percent of executive officers, 6 percent of CEOs. And as one of those CEOs, I would love to hear your views of how we increase women on the front line, as you have talked about doing the

manufacturing, but then also in the board room and as executive officers.

Ms. Miller. Well I think we have to be role models. As business owners, I know myself it is easy to get engaged in my day-to-day business and to really just focus on that, but I feel it is critical that I go out and meet with other business owners, and others in manufacturing, and explain to them how I got to where I did. You know, I have a similar story. I grew up in rural Minnesota on a farm, and in fact when I took over the company my dad said he was worried that I couldn't even pound a nail, so how could I possibly run a machining company?

But, I think it is just critical that we get out there and we network. I belong to Women In Manufacturing. This year I am going to be the first woman president in our Precision Machine Products National Association. And again, I think that is showing other women that we can, and we are good at it.

It is a team effort, but we bring different skill sets than our male counterparts. It is just imperative we network.

Vice Chair Klobuchar. Very good. Mrs. Jolley, you talked about your own kids and how important it is to expose them to science, technology, math, and see this as a possibility, as Ms. Miller was discussing.

Do you want to talk about how we best ensure that girls are going into these fields, and are prepared? Because it really does start at a young age.

Mrs. Jolley. I have a three-year-old daughter. Her favorite iPhone app is Math Magic. Now she doesn't know the answers, right, but she knows her numbers. And she will sit—you know, we are driving somewhere, and she will sit and she will say, "Mom, what is 3 and 1?" And we go through it. And she memorizes it.

And my husband, he's a big tester, okay? He's like the threshold is high, you've got to make it. And so I mean it's things like that. But she is excited. That is fun for her. So you have to make it fun. And I think—it's been awhile—science fairs, or whatnot, where you are creating things, and you are building things, and getting into the innovative aspects of things, show that, show that, show that.

Even internally. Noble is hosting an innovation conference week after next, and there's going to be a huge number of people from all over Noble's global operations coming in to show some of the creations that they have done within the workplace.

So take that out. I mean, we just take that out into the school. I think the 4th Grade teachers would love to have you come do a show-and-tell for an hour. It's as easy as that. Push it down. Push it down.

Vice Chair Klobuchar. Exactly. I was just remembering at one of our suburban high schools I visited, and a company Seagate had volunteers that would come in every week and work with the shop class. And they had these kids making automatic pool ball sorters. So that when the pool balls went out, they would automatically sort in the right order. And I remember asking these high school boys, "Well what are you—who do you think is going to buy this?"

And they said, "People who have everything."

[Laughter.]

Vice Chair Klobuchar. But the point of it was your point, Ms. McNelly, about products, that to interest them they actually have to see what they're making, and see how cool it is, and see that as part of the desire to go back into manufacturing. And we'll end with that.

Ms. McNelly. I was going to note, Vice Chairman Klobuchar, one opportunity that does exist is National Manufacturing Day. On October 4th, factories across the country will open their doors and invite their communities in.

Last year, we had over 200 manufacturers across the country. And we really think that in order to understand the role you can play in manufacturing, you actually have to walk through one of these high-tech facilities, see the computer integrated machines, the design element. So I would encourage all of you to consider visiting a facility on October 4th this year.

Vice Chair Klobuchar. Well thank you. Thank you to all of you. I am sorry I have to leave, but I leave this in able hands with Chairman Brady. Thank you.

Ms. McNelly. Thank you.

Chairman Brady [presiding]. Thank you, Vice Chair. This is terrific testimony on an important topic. It is frustrating to think that there could be 600,000 jobs going unfilled these days, and that is a topic, as well. How do we take that mismatch and make it work together?

It was really interesting to hear about the importance of sponsorships and advocacy in attracting skilled women into manufacturing.

And, Mrs. Jolley, to your point. Energy is manufacturing. It's manufacturing oil and natural gas. And to your point about in the financial area, we work on tax reform a lot, and we meet with tax leaders across the country. And you're right, the growth of women in those top positions has changed dramatically, and that is encouraging.

I want to ask this question: In manufacturing total, energy included, our workforce is starting to age out. There is a real concern going forward. You all sort of referenced this, but how do we go about—how do firms go about obtaining a younger, skilled workforce? Is this an opportunity for us to attract more women into manufacturing?

Ms. McNelly. Chairman Brady, that is a great question. From our perspective, the example Darlene Miller gave on the use of our Nation's community colleges and industry-based credentials as a clear career pathway for individuals to be successful, from our perspective a good welding program in this country is one that trains somebody to an American Welding Society Standard.

A good machining program is an individual walks out with not just their academic certificate, but equally a National Institute of Metal Working Skills. And those opportunities can start in a fast-track environment.

I'll use the example of our transitioning Veterans and our work of Get Skills To Work, where we have so many transitioning Veterans with strong technical skills and no clear career pathway back into civilian—into the civilian world. So how can we take advantage?

Someone may have machined a part but not be a machinist, may have welded but not be a welder. How can we put those individuals into short-term training programs grounded in an industry credential and start their career in manufacturing? That equally then speaks to the other pillar of not just sponsorship but development, and how individuals then need clear career pathways so that they always know they can go back to a community college, get additional training, and advance further in their company.

So we do think that the Nation's community and technical colleges are a really important resource for our Nation's employers. And the middle-skills' jobs that you see represented here, because that really is what builds this Nation's middle class.

Chairman Brady. Got it. Ms. Miller, you probably agree, because you led out talking about the importance of the community college tie-in.

Ms. Miller. Absolutely. I think it is really critical, that the businesses engage directly with the college and get them to come out to their facility, to see what we need because sometimes they are teaching skill sets that are really not relevant in our workplace, or are old and outdated.

Our equipment is very high tech. It's \$400–\$500,000 for a machine. We really need really excellent math skills and problem-solving skills. So it is absolutely imperative the schools teach those math skills, and teach what we are looking for. But if we do not go out there and tell them, they do not know what that is.

Another thing, is to get into the middle schools. And again, I think the businesses have to do this. The middle schools, the high schools, and explain what manufacturing is about.

I was just at Thaddeus Stevens last week and spoke about "Right Skills Now," and they have a program called "Adopt A Kindergarten," where they have three female professors who actually go to the kindergarten classes in their area. One used to be a certified plumber and now is teaching plumbing at the school. They are all in the non-typical female roles and they mentor these girls from kindergarten through 12th Grade.

We need more programs like this so that we expose kids, and especially women, at a young age.

Chairman Brady. Great.

Mrs. Jolley.

Mrs. Jolley. Noble engages in Junior Achievement in a couple area Houston schools. And so again we have sort of the repetitive presence of the same individuals throughout the years. We are embarking I think on our 5th year with one particular school. And that is down to the elementary through the high school level. So I think that just goes to the—or reinforces the point that is being made, that for people to know what they can do, they have to know what is out there to do. And I think that Noble takes it very seriously, and we try and engage our employees in what is volunteer activity, but because we can see that it adds down the road to valuable employees that can only help our own businesses succeed.

Chairman Brady. Well thank you all very much, appreciate it. Representative Maloney is recognized.

Representative Maloney. Thank you very much.

I would first thank all the panelists, and certainly Vice Chair Klobuchar for her excellent report. And really the Chair, too, for his sensitivity and devotion to what is a really critical issue.

Too often women's issues are swept under the rug and not seen, and this is an important hearing in my opinion primarily because we are growing manufacturing jobs. Let's make it in America. Let's grow our job base.

But during this time of growth, women lost jobs. They lost roughly 28,000 jobs. And I would like to try to understand why this happened.

Ms. Miller, I loved your story about your director saying I'm leaving because obviously there's no way a woman could succeed, and of course you have succeeded. All of you have succeeded.

So I would like your insight, and all of the panelists, really, on what we can do about the 77 cents to the dollar. We seem to be stuck at 77 cents to the dollar for 20 years. It has not moved. It has not budged.

What can government do, if anything, to help in that area? Obviously education. We are moving ahead in education, yet it is not translating itself into successful statistics.

And if you look at the glass ceiling, it is particularly hard for anyone moving up, for a CEO. You are quite extraordinary. Very few women are successful CEOs. And reports have shown that the 77 cents to the dollar gets worse in most job categories, with the exception of areas where women dominate such as in health care and education.

In fact, I showed—did a report called “A New Look At The Glass Ceiling” that showed that five years out the disparity falls, sometimes 15, 20 percent.

So I would like to ask Ms. Miller, and then Ms. McNelly and Mrs. Jolley to comment on that. What can we do to break that 77 cents to the dollar that seems to be cast in stone? And other opportunities to move up the line. We all know the numbers. The number of CEO women is, you know, minuscule compared to men—although our educational capabilities and intellect are the same.

Ms. Miller. Unfortunately, that is true, but I do feel that we women act differently. Our male counterparts are the first ones to come up and ask for that raise, or bring their skill sets to the forefront and I hear so often where women do not do the same. I get really frustrated because I do not feel there is as much of a glass ceiling as we women make of it. So I think again we women have to go out there and really encourage and mentor other women to make sure that they realize their talents and expose them to their employers.

It has been a challenge I know for years. It is not that way in my company. And when I speak, I really try to encourage people, women, to get out there and encourage other women. I wish I had the answer. I don't. But I just do think we need to toot our own horns a little bit louder and maybe we can make that change.

Representative Maloney. Ms. McNelly, and then followed by Mrs. Jolley.

Ms. McNelly. I am going to speak to the opportunities in manufacturing. And in the end, manufacturing pays more than any other sector.

So as we increase women's participation, we equally will increase their wage gains proportionate to the U.S. economy. And part of that comes back to exposing women to the opportunities of these great family-sustaining careers in manufacturing.

So from my perspective, by expanding the opportunities and exposure to women in manufacturing, we will in fact have the opportunity to grow them within this great family-sustaining middle class jobs, middle-skills jobs environment in this economy.

Mrs. Jolley. This is an area that I have a lot of passion around, because again I have two young children. I think companies need to focus on the fact that it is usually women who take a break, right? Some of that disparity is because women take a break.

So you need to make it much easier for them not to take a break, right? So, for example, Noble is moving to a new headquarters. We are partnering with the local YMCA that is across the street for on-site extended day care. Flex time. Things that can allow part-time work, or that make it easier for somebody who when they have a child can come back much more quicker or easier to integrate. Job sharing opportunities.

Noble is engaging in some of these activities, and more.

Representative Maloney. I only have 13 seconds left, and we are on a tight time. I just want to hear any of your ideas of manufacturing. We are losing jobs in manufacturing for women. Why is that? Is it training we need? What do we need to address to get more women in manufacturing?

Ms. Miller. It is the perception, mainly. But the other thing is, we have to have credentialed programs. We have to have certified programs in manufacturing so that it is rated as high as a four-year college degree—instead of a second-class citizen, or a second-class job.

So credentialing our manufacturing is really I think key to making it a viable career.

Representative Maloney. Thank you. My time has expired. Thank you, Mr. Chairman.

Chairman Brady. Thank you. Representative Paulsen.

Representative Paulsen. Thank you, Mr. Chairman.

This is great testimony on an important topic. I have had a chance, Mr. Chairman, actually to spend time on the floor of the operations of Ms. Miller at her company, and I can assure you that she is a leader in her industry and is playing a key role in Minnesota's economy in many, many ways.

I just want to mention, too, as the father of four daughters it is great to see all of you here successful today, but it is also awesome to know that women are rising to the top of their fields, and they are breaking through these glass ceilings in a whole variety of different industries.

These glass ceilings have stood in their way for a long period of time. I guess my question is this: What can government do, or what can Congress—what should Congress be focusing on, now that women are rising through the ranks? They are becoming more successful in breaking these ceilings, and they are competing against what has been the status quo—you know, men in different fields. And how can we harness that opportunity? Because it is an opportunity when women are being underrepresented in the area

of manufacturing, as was pointed out, so that we can continue America's leadership, and innovation, and growth, and invention, and creating new things, and making things, building stuff. I mean, what should our role be?

Is it focusing on STEM education, knowing that there is where more high-skilled work is going to be going down the road? And what is that going to mean as the labor market shifts in the need for high-skilled workers? Ms. McNelly?

Ms. McNelly. Darlene actually mentioned the importance of a quality, skilled workforce and how you create transparency out of the education system.

One opportunity that Congress has is the America Works Act, which would in fact prioritize federal funding in job training to programs of study that end in an industry-based credential. So that programs across the country like the Right Skills Now program could have the right federal resources and job training, and that job seekers can understand what length of training they needed; how long it was going to take; and what their employment opportunities could be at the back end.

So we do think that legislation like America Works could in fact support closing our Nation's skills gap.

Representative Paulsen. Ms. Miller, you have been involved in advocacy, professional development, sponsorship, as was mentioned earlier, but what else should we be focused on as a part of helping this effort?

Ms. Miller. Well I think highlighting the manufacturing stories and success stories, and really getting the word out there that manufacturing is here to stay; that we produce over 21 percent of all manufactured products in the world. We really need to get that message out.

The other thing is to really provide the scholarships and the monies for training for STEM careers, to include machining, or for manufacturing in any mode, like we do for the four-year colleges. We do not contribute near as much, or have the government funds available for people to go into those career paths as we do the four-year degrees. If that was equal, we would see more people in our industry. Thank you.

Representative Paulsen. Ms. Jolley.

Mrs. Jolley. So my background is finance and tax, and what I really think is you have to have a focus on a business friendly environment. You have to stimulate the growth. Make sure the United States continues to be and improves upon its location as a great place to do business.

I don't know much about the people aspect and how to encourage job growth particularly for females, but I do know that if you've got businesses here—I mean, in the energy industry we have seen a renaissance over the last few years. And those energy products go downstream. They are the inputs for the manufacturing processes all along the way.

And so if you continue to focus on making the U.S. a great place for Noble Energy and other companies like this, you make it a great place for the manufacturing industries to increase their own businesses here in the United States.

Representative Paulsen. Yes. Well again this has been great testimony, Mr. Chairman. I just note that one of my four daughters has an interest maybe in being a pediatrician some day, and helping people, helping others, right, it's kind of in her nature. She wants to do that.

And I said, well, maybe you should think about touring a medical device company, which we have a lot of in Minnesota, obviously, and then that would allow her to invent things, create things to help improve life for lots of people rather than just on an individual-patient basis. So I am trying to generate those similar ideas and concepts with some of my young girls.

Thank you, Mr. Chairman.

Chairman Brady. You're welcome. I have met Congressman Paulsen's girls. Soon four of the Fortune 100 companies will be headed by Erik's kids.

[Laughter.]

I'm pretty certain of that.

Representative Delaney.

Representative Delaney. Thank you, Mr. Chairman. And I just realized my colleague from Minnesota and I have something in common, because I have four daughters, as well. So you've got the four-daughter club up here, which is why we probably both mildly disagree with my colleague from New York's comments when she said that men and women have identical intellects. I would conclude pretty quickly that women have superior intellects, at least based on my experience over the years. And that is not just informed by my household.

This is great testimony. Thank you for being here. And it really is important testimony particularly with regard to energy. Because I think the comment was made about energy, because it seems to me the energy revolution that is going on in this country, which I actually think we underestimate and do not talk about enough in terms of how utterly transformative this is, is, together with technology, really a massive opportunity for U.S. manufacturing to be perhaps more competitive than it has ever been, depending upon the sector.

So it is a really, really good topic. The data that you all went through in your testimony, I'm not going to go over that again, it was great. It is a concerning topic when you consider almost 60 percent of the college graduates are women, over half the workforce is women. But last year when people were promoted to vice presidents, only 25 percent of them were women. And when they were promoted, promotions occurred in the C Suite, it was only 15 percent women.

So that is a concerning trend. One of the things that has always struck me is some data that I saw that said that when young boys and girls, age 5 or 6, are polled about what they want to do when they grow up, their answers are very similar. In other words, the number of young boys and girls that want to be presidents, astronauts, CEOs, go down the list, is very similar.

When 15 or 16 comes along and they do the same poll, it starts to diverge significantly. And I worry about kind of a disempowering message that society is delivering to young women in terms of a

whole variety of things, but including their opportunities in the corporate workforce.

Because the problem that we have with women progressing across all of corporate America is obviously a multi-dimensional problem, and there are a lot of components to it. And I think you touched on some really good ones, particularly the comments about making it a work-friendly environment.

Prior to being in Congress, I ran a company that I started that was a public company, and it always was rated one of the best places to work in the D.C. area. And it was all because of those things. And it was a huge asset in attracting talent.

But I actually want my question to come back to this somewhat disempowering message that I see. And, you know, I am probably relatively insensitive to it as a man, but you definitely see it in the media. You see it in society. That women are still portrayed differently than men in their careers, et cetera.

So I don't mean to lift up from a hard database presentation, which this has been and it's been really terrific, and ask a question that's a little more qualitative in a way, but do you have any observations on that, how big of an issue that is in terms of this problem? Anyone can start.

Ms. McNelly. I actually think one of our challenges in manufacturing is marketing the opportunities. Because we do in fact make jets fly. We make food taste better. We make life-saving medical devices. Yet we are not very effective at how we communicate.

And I often think that when you survey young children as to what they want to be when they grow up, it is what they are exposed to. So opportunities like National Manufacturing Day, to open up the doors and to see the difference. Because I also do think that women are often motivated by grand challenges on the differences that women can make.

And when I think about the importance of manufacturing in a global economy, it is manufacturing that will solve many of our world's global challenges. Energy is a manufacturing process as we build infrastructure.

So I do think a piece of that is the responsibility of manufacturers to share what we do very openly to inspire the next generation, because we do make great things.

Representative Delaney. Right.

Ms. Miller.

Ms. Miller. I think it is important to do these programs like Hope For Tomorrow, also to expose these kids at a young age that they can excel in any of these fields; and that they can be involved in any career path they choose, rather than just the stereotypical ones.

I think, in business it is really critical that we realize I give men as much time off to go watch their kids' games, or to go to their doctor appointments with their kids, or school conferences, or whatever. So we need to get that out, that men and women are treated equally in their time off, and that we don't expect just women to go take on those roles. We expect the men to do it also.

I think if companies could highlight this, it would also help.

Representative Delaney. Mrs. Jolley.

Mrs. Jolley. Thank you. Yes, my 5-year-old boy and my 3-year-old girl both want to be super heroes right now. But I think it is important, everything in here is manufactured in some way, right? So it is an easy call.

You know, how do you make this plastic bottle here? Where does it come from? Where does this come from? Who makes it? And it is very easy in a show-and-tell particularly with the young kids to say this is important. This makes you happy, right? This helps your life?

We sponsor a young child in El Salvador, and it was incomprehensible to my 5-year-old that he wrote us a thank you letter that they used some money we sent them for food, right? And it was a question, well, can't we buy him a toy?

So it's important: Well, that toy is manufactured, right? And where does all that come from? So at the young age, it is just by example, by example, by example. And you can make that. You can make that somewhere along the line.

Representative Delaney. Thank you.

Chairman Brady. Thank you, Representative. We are very respectful of your time, as we wrap up.

Let me, on behalf of Vice Chair Klobuchar, thank you for being here today. You three are really mythbusters. I mean, the myth of America doesn't make anything anymore? Clearly we do. You know, America can't compete anymore? Clearly we do, becoming the most productive manufacturing sector in the world. And women don't manufacture? They do, in a big way.

And we have got an opportunity with an aging workforce to use the tools you identified that work, and to apply those into a bigger space going forward.

So I again want to thank you all for being here. This meeting is adjourned.

(Whereupon, at 11:05 a.m., Wednesday, May 15, 2013, the hearing was adjourned.)

SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF HON. AMY KLOBUCHAR, VICE CHAIR, JOINT ECONOMIC COMMITTEE

I want to thank everyone for being here this morning to have this important conversation on the role of women in manufacturing and to discuss ways women can play an even greater role in the future.

Today's hearing will examine manufacturing's impact on the economy, look at the challenges facing manufacturers and explore how—by increasing women's participation in the sector—we can strengthen manufacturing and bolster our economy. This hearing will cover many of the same topics as the report I released yesterday on women in manufacturing.

I'd especially like to thank our distinguished panel of witnesses:

Ms. Jennifer McNelly is President of The Manufacturing Institute, the non-profit affiliate of the National Association of Manufacturers. She has led the development of the Manufacturing Skills Certification System, which certifies a set of nationally portable, industry-recognized manufacturing skills.

Ms. Darlene Miller is the President and CEO of Permac Industries in Burnsville, Minnesota. Permac is a precision machining company that custom-manufactures parts for customers around the globe in industries including aerospace, medical technology and transportation.

Mrs. Amy Jolley, is Vice President of Tax at Noble Energy, Incorporated, an exploration and production company with domestic and international operations. She is responsible for Noble's global tax matters.

For decades, manufacturing has been a pathway to the middle class for millions of families—offering good wages, good benefits and a shot at home ownership.

Manufacturing remains central to the U.S. economy today, making up about one-eighth of GDP. And, manufacturing is a major driver of innovation, accounting for 70 percent of research and development carried out by U.S. industry and generating 90 percent of patents. From the pacemaker and the Post-It note in my state, to the hand-held calculator in Texas, to air conditioning in New York, to a "smart" polymer that introduces medicine into the bloodstream in Maryland, to the first nuclear submarine in Connecticut, manufacturing powers innovation across our country.

While manufacturing employment has rebounded during the past three years, there is a gap today between the skills employers want and the experience workers have. In a recent poll of manufacturing companies in my state, 60 percent of respondents said it was hard for them to find workers with the right skills and experience, up from 40 percent in 2010.

When I travel around Minnesota, I hear from too many companies that they want to grow, but can't fill open positions. They have vacancies for welders and tool and die makers. I cannot tell you how many managers of plants have told me that we just need someone who wants to learn these skills, or who has these skills.

That's a serious challenge right now, and it is likely to become an even bigger challenge: half of manufacturing workers are 45 years old or older, which means that looming retirements will increase the unfilled demand for skilled production workers.

There is an additional reason to get more women in manufacturing. As described in a Mother's Day report that I released last week, nearly half of mothers work full-time outside of the home and mothers are the sole breadwinner in more than one-third of families.

Manufacturing jobs pay well, helping women contribute more to their families' financial wellbeing.

Continuing to strengthen U.S. manufacturing is both an immediate and long-term priority for our nation, and tapping the talents and knowledge of women workers must be part of the solution.

Women are underrepresented in the manufacturing workforce—and are losing ground. Women's share of manufacturing employment has been falling steadily since 1990 and is now at its lowest level since 1971. Women make up just 27 percent of the manufacturing workforce.

While the manufacturing sector has added more than half a million jobs since February 2010, men have accounted for all of these gains. During this period, women actually lost 28,000 manufacturing jobs.

In order to change that—and in order to help manufacturers meet their hiring needs—we need to identify new ways for women to be exposed to, trained for and participate in future opportunities in manufacturing. Companies need the opportunity to better access the talents, expertise and experience of women workers.

Here are a few important steps we can take.

First, we must strengthen Science, Technology, Engineering and Math (STEM) education. I have a bill that would double the number of STEM schools and we must

ensure that girls and young women are encouraged to take full advantage of these new opportunities. STEM skills are so important for today's technology-driven manufacturing jobs.

Closing the achievement gap in math and science will ensure that young women have the confidence and ability to pursue a degree or training in math, science and engineering.

We also need to do a better job of matching the skills taught in the classroom with the skills needed in the workforce.

Partnerships between employers and their local two- and four-year colleges can ensure that course offerings align with what's going on in the economy. These partnerships work: I've seen this in schools across Minnesota.

I think of the "Right Skills Now" program at Dunwoody College of Technology in Minneapolis, which is bringing local businesses to the table to better match course offerings with employer needs. One of our witnesses, Ms. Miller, is a founder of that program and I hope she will be telling us more about the program's successes.

The Manufacturing Institute's work to create nationally portable, industry-recognized manufacturing skills credentials can help us address the skills gap. Integrating trade-specific credentials, such as welding, into community college programs will help graduates get good-paying jobs, help employers find the workers they need and enable women to more fully participate in these occupations.

Part of the challenge in recruiting more women to manufacturing is that the perception of manufacturing hasn't caught up with today's reality. This is not your grandpa's factory floor anymore. Advanced manufacturing techniques are reshaping the sector. Sophisticated robots have joined the ranks of the wrench and hammer, and workers increasingly depend on math and engineering skills.

Yet, not enough young women think of manufacturing as a career path. High school girls should be exposed to manufacturing opportunities so they can pursue education or training that prepares them for a career in manufacturing.

Mentoring programs are great tools to expose girls and young women to manufacturing careers and can also help employers attract and retain women. They have been especially important in helping women rise in the ranks of leadership in the industry. When women work in industries where men have traditionally dominated the workforce, having a mentor to turn to for advice, support and guidance can boost satisfaction and retention.

Formal mentoring programs and informal networks are relatively inexpensive to create and can pay huge dividends down the road by helping women stay in the industry and achieve success.

Finally, I believe we need to be building an innovation agenda for America—a competitive agenda that brings us back to brass tacks.

Manufacturing has always been at the heart of innovation in this country. America must be a country that makes stuff again, that invents things, that exports to the world, and to do that we need to do a better job of harnessing the skills and talents of women in the manufacturing industry.

I would like to recognize the leadership of Congresswoman Carolyn Maloney of New York on women's employment issues. I'll recognize Chairman Brady in a moment, but first I would like to yield a minute of my time to Congresswoman Maloney for her remarks.



Women in Manufacturing

The manufacturing sector is vital to the overall health of the U.S. economy. Manufacturing provides jobs with good wages and solid benefits and helps to spur growth in other sectors of the economy. Despite its importance to the economy, employment in the sector has shrunk considerably since its peak in the late 1970s. There are, however, signs of recovery. Over the past several years the manufacturing industry has consistently added jobs—between February 2010 and April 2013, employment in the sector grew by 530,000 jobs.¹ (See Figure 1.) However, women, who make up nearly one-third of employees in the sector, have largely been excluded from the expansion, losing 28,000 manufacturing jobs during that period.²

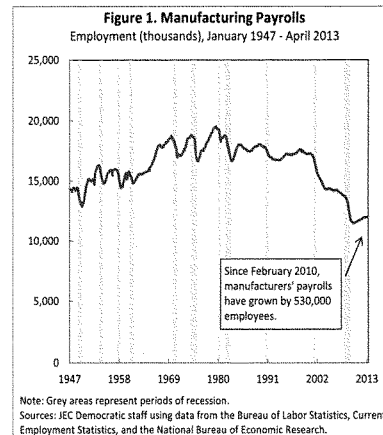
With U.S. manufacturing making a comeback, this study highlights the role of women in the industry, including recent trends in women's employment. It also explores barriers to employment and advancement that women face and actions that can be taken to eliminate those obstructions.

Manufacturers report having difficulty finding and retaining skilled labor, and that the resulting shortage is severe enough that it can impede production and innovation.³ In fact, if manufacturing jobs were being filled at the same rate as they were before the recession, the unemployment rate in the industry would be about 1.5 percentage points lower than it is today.⁴ Furthermore, the manufacturing workforce is aging faster than other segments of the economy; more than half of all manufacturing employees are 45 years or older.⁵ The looming retirement of so many employees in the sector means that the demand for new talent to fill skilled production jobs will only grow.⁶ Since women now make up nearly half the

total labor force, employers should look towards this underutilized pool of talent to meet their future manufacturing workforce demands. The economy and the nation can benefit from the skills, knowledge and leadership women can provide.

The Importance of a Strong Manufacturing Sector

A robust manufacturing sector is crucial for economic growth. U.S. manufacturing accounts for 12% of Gross Domestic Product (GDP) and, by itself, would rank as the tenth largest economy in the world.⁷ Manufacturing is also vital to America's competitiveness. Manufacturing accounts for 70% of research and development (R&D) carried out by



U.S. industry⁸ and generates 90% of patents.⁹ The National Association of Manufacturers estimates that “every \$1.00 in manufactured goods generates an additional \$1.48 worth of additional economic activity – more than any other economic sector.”¹⁰

Manufacturing also supports jobs in other segments of the economy. Research has shown that the employment multiplier is higher in manufacturing than in other sectors of the economy—each manufacturing job supports an additional 2.9 jobs in other industries, a much higher multiplier than for employment in retail trade or business services.¹¹ The larger manufacturing multiplier is partly explained by the large number of supplier jobs supported through manufacturing. For example, manufacturing jobs support more than four times as many supplier jobs as retail trade employment does.

Additionally, manufacturing jobs pay well—on average, hourly compensation is 17% higher than in other industries.¹² Higher earnings help explain the larger multiplier for manufacturing jobs than for jobs in other sectors that do not pay as well. Manufacturing jobs are more likely to come with benefits, including medical and retirement benefits, than service-sector jobs. They also are more likely to require on-the-job training than jobs in other segments of the economy.¹³

Despite the vital role manufacturing plays in economic growth by providing good-paying jobs and spurring growth in other sectors of the economy that support manufacturing, until recently, employment in the sector was declining. Manufacturing employment peaked at 19.6 million employees in June 1979, when 21.7% of the labor force was employed in this sector. The decline in manufacturing employment accelerated in the 2000s, and by the start of the recession in December 2007, only 10% of the labor force was employed in the manufacturing sector. Manufacturing was one of the hardest-hit industries during the recession, losing 15% of an already reduced workforce.

Even with the recent gains in manufacturing employment, the most recent data show that less than 9% of the total workforce is employed in

manufacturing.¹⁴ But the growth over the past three years is a promising sign that this sector will continue to add jobs as the economy expands.

Signs of Revival in American Manufacturing

Recent trends suggest that the current expansion in manufacturing may continue in the coming years. A handful of companies have already announced plans to move production operations back to the United States from overseas, including Caterpillar, GE and Ford. Lenovo, a computer manufacturer based in Beijing, opened a manufacturing plant in North Carolina in January of this year,¹⁵ and BASF, a German-based chemical company, is also expanding operations in the U.S.¹⁶

Several factors have made locating or relocating production in the United States more attractive for companies. First, worker productivity in the U.S. continues to rise across all sectors, and it has risen faster than average in manufacturing. Between 1987 and 2008, U.S. manufacturing productivity grew at an annual rate of 3.4%, compared to 2.2% for all nonfarm business. At this rate of productivity growth, the amount a worker produced doubled in 20 years.¹⁷ Since then, productivity gains in manufacturing have continued to exceed gains in the overall nonfarm business sector.¹⁸

Strong productivity performance in the United States is occurring at the same time as recent wage increases among key competitors, such as China. The shrinking gap in labor costs between workers in China and the United States has made the potential savings from employing Chinese workers smaller than in the past. In fact, by one estimate, the savings is on track to shrink from roughly \$17 per hour per worker in 2006 to about \$7 per hour per worker by 2015.¹⁹ According to a survey of U.S. companies operating in China, 47% of respondents cited rising labor costs in China as the top threat to their business.²⁰

The comparatively lower cost of available fuel that has resulted from the recent shale boom may also lure some manufacturing companies back to the

U.S., particularly those that use natural gas in their production activities.²¹ Shale gas prices in the U.S. are less than a quarter of European and Asian prices, and manufacturing companies are expanding to take advantage of the lower costs.²² Chemical manufacturing is particularly energy-intensive, and it is estimated that the industry will invest \$30 billion in the coming years to build chemical plants in the U.S. due to the availability and low price of natural gas.²³

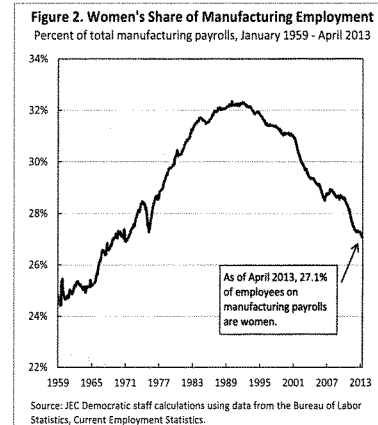
Women's Role in Manufacturing

Amidst all the promising signs in U.S. manufacturing, one disparity continues to make headlines—the recent job gains in manufacturing have been largely among men.²⁴ While overall the sector has added 530,000 jobs since February 2010, men have gained 558,000 jobs during that time, and women have lost 28,000.²⁵

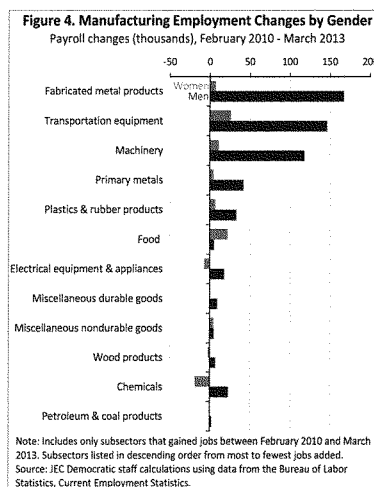
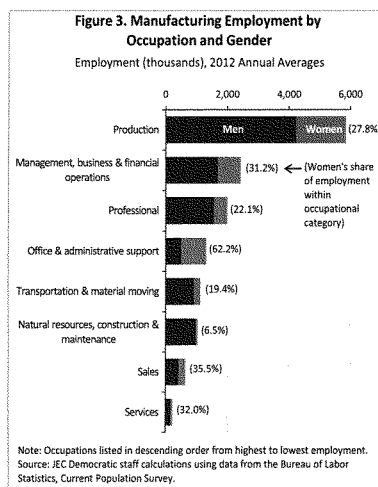
Historically, men have held the majority of jobs in manufacturing. At its peak in 1990, women's share of employment in the sector was only about 32%. Since then, the share of female employees has steadily fallen, and it has continued to fall even as the sector has added jobs over the last three years. According to the National Women's Law Center, the job losses that occurred during the recession were borne proportionately by men and women, so the recent disproportionate gains by men "are not just a correction for men's recession losses."²⁶ Women's share of manufacturing employment is now 27%, the lowest it has been since 1971.²⁷ (See Figure 2.)

Detailed industries. Women are employed throughout the manufacturing industry.²⁸ Unlike men, whose employment is heavily weighted towards durable goods jobs, women's employment is more evenly split between durable and nondurable goods. In fact, of the 3.3 million women in manufacturing, roughly 1 in 6 (16%) work in

food manufacturing, a subsector of nondurable goods manufacturing. Manufacturing of transportation equipment and computer and electronics employ 11% and 10%, respectively, of women in the sector.



Occupations. Overall, fewer than 30% of manufacturing employees are women,²⁹ but women comprise larger shares of workers in some occupations within the manufacturing sector. Women make up over 62% of workers in office and administrative positions, and about 35% of sales employees. (See Figure 3.) They make up smaller shares of employment in production occupations; transportation and material moving; and natural resources, construction and maintenance. However, production is the largest category of employment within the industry, comprised of jobs ranging from first-line supervisors to welders to sewing machine operators, so more women work in production occupations than in any other category within manufacturing.



The Shortage of Women in Manufacturing

The decline in women's manufacturing employment even as the sector is growing raises the question: why have women not shared in the recent job gains? Most of the overall job gains were concentrated in durable goods manufacturing, specifically in fabricated metals, transportation equipment and machinery. Smaller net gains were posted in primary metals, plastics and rubber products and food manufacturing. In all of these subsectors, as well as in food manufacturing, women saw small employment increases. (See Figure 4.) However, in most of the remaining subsectors, women's employment fell regardless of whether men experienced small increases or decreases in employment. Clearly, the resurgence in manufacturing has not yet taken hold for women.

Research highlighting the shortage of women in manufacturing has focused on several issues that may be holding women back from playing a more prominent role in the industry. The first is the perception that manufacturing is a stagnant

industry. While some areas of U.S. manufacturing have shrunk as production has moved offshore, the sector is still about one-eighth of the economy, and has added over a half-million jobs since February 2010.

Additionally, the long-standing stigma that jobs in manufacturing require difficult physical labor and are only for men no longer holds true. Advances in technology have changed the way goods are produced, and many manufacturing jobs now require highly specialized technical skills and little physical labor. By one estimate, there are 600,000 openings for manufacturing jobs that require advanced skills.³⁰ Still, only 56% of Americans believe that manufacturing jobs are clean and safe, and 27% of Americans still do not view manufacturing as a high-tech industry.³¹ Furthermore, only 35% of Americans would encourage their children to pursue a manufacturing career.³² A recent survey of more than 600 women currently working in the manufacturing industry found that 70% of those women would encourage

their sons to pursue a manufacturing career, but only 55% would encourage their daughters to do the same.³³

Solutions

Among women already working in the industry, there is agreement that the factor contributing most to women's underrepresentation in manufacturing is the perception of a "male-favored culture."³⁴ Dispelling the myths about U.S. manufacturing is critical to attract more women to the sector. In addition, solutions should focus on:

- Increasing STEM (Science, Technology, Engineering and Mathematics) education participation and proficiency for girls beginning as early as elementary school;
- Equipping women with the skills and knowledge desired by employers to prepare them for careers in the growing segments of manufacturing through vocational and community college programs;
- Increasing the ranks of women in leadership roles, which has been proven to boost bottom lines and will show women that there is a path for growth in the sector; and
- Encouraging employers to develop mentoring programs so women in all areas of manufacturing have role models to provide guidance, which can help improve retention rates.

STEM Education. Assessments of elementary school students show that girls score above boys in reading but lower in math, and the disparity continues through high school.³⁵ Closing the achievement gap in math and science from the beginning will ensure that young women have the confidence and ability to choose to pursue a degree or training in areas such as math, science and engineering. Although women today earn a greater share of bachelor's degrees than men, they earn less than half of those awarded in math and physical

sciences and less than one-fifth of those awarded in engineering and computer sciences.³⁶ Increasing the number of women who move through the STEM pipeline will expand the pool of women prepared for careers in advanced manufacturing.

Community Colleges and Vocational Programs.

Initiatives that focus on changing the perception that technical training is inferior to a formal degree from a 2- or 4-year college can attract more individuals, both men and women, to enroll in training that will prepare them for manufacturing careers. Specifically, employers can work with community colleges to integrate trade-specific credentials into formal degree programs, which would provide a pathway from training to employment. Schools should also work with employers to recruit women for such programs.

Women in Leadership Roles. Increasing the number of women in leadership roles within the industry is one way to attract and retain women throughout the ranks in manufacturing. Across manufacturing firms, women hold only 17% of board seats, are only 12% of executive officers and are just 6% of CEOs—despite making up nearly 30% of the sector's labor force.³⁷ Research has shown that a higher share of women at the top translates into a higher return on equity and higher returns to stockholders; increasing gender diversity among leadership roles makes good business sense.³⁸

Mentoring Programs. Encouraging employers to implement formal mentoring programs and support informal mentor-mentee relationships will help those employers retain talented female employees. With relatively fewer women working in the industry, role models and mentors from across the ranks—from the assembly line to leadership—can provide women with the support and guidance they need to navigate a career in the manufacturing sector. Mentors can also boost the visibility of women in the field, showing that women often are successful in manufacturing.

It is clear that the future of manufacturing will depend on employers' ability to recruit and retain workers. Women should be part of the solution.

Sources:

- ¹ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, Current Employment Statistics (CES).
- ² Ibid.
- ³ Deloitte/The Manufacturing Institute. *Boiling point? The skills gap in U.S. manufacturing*. 2011. www.themanufacturinginstitute.org/~media/A07730B2A798437D98501E798C2E13AA.ashx.
- ⁴ This is based on the change in the relationship between the job openings rate and the unemployment rate from the end of the recession to now. The relationship between job openings and unemployment is known as the Beveridge curve. For example, the current (March) job openings rate for the manufacturing industry is 2.1 percent, the same as it was in January 2008 just after the start of the recession, but the current unemployment rate is about 6.1 percent (seasonally adjusted) compared to 4.6 percent back in January 2008.
- ⁵ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, Current Population Survey (CPS).
- ⁶ Ibid.
- ⁷ National Association of Manufacturers. *Facts About Manufacturing in the United States*. www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx.
- ⁸ Wolfe, Raymond M. *Info Brief: Business R&D Performed in the United States Cost \$291 Billion in 2008 and \$282 Billion in 2009*. National Center for Science and Engineering Statistics. March 2012. www.nsf.gov/statistics/infbrief/nsf12309.
- ⁹ Executive Office of the President. *A Framework for Revitalizing American Manufacturing*. December 2009. p.7. www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf.
- ¹⁰ National Association of Manufacturers. *Facts About Manufacturing in the United States*. www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx.
- ¹¹ Bivens, Josh. *Updated Employment Multipliers for the U.S. Economy (2003)*. Working Paper No. 268, Economic Policy Institute. August 2003.
- ¹² Langdon, David and Rebecca Lehrman. *The Benefits of Manufacturing Jobs*. Economics and Statistics Administration. May 2012.
- ¹³ Ibid.
- ¹⁴ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES. Data through April 2013.
- ¹⁵ Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- ¹⁶ Birnbaum, Michael. "European industry flock to U.S. to take advantage of cheaper gas." *Washington Post*. April 1, 2013. http://articles.washingtonpost.com/2013-04-01/world/38182416_1_natural-gas-shale-gas-basf.
- ¹⁷ Executive Office of the President. *A Framework for Revitalizing American Manufacturing*. December 2009. p.6. www.whitehouse.gov/sites/default/files/microsites/20091216-manufacturing-framework.pdf.
- ¹⁸ JEC Democratic staff calculations based on data from the Bureau of Economic Analysis. Data from 2008-Q4 to 2013-Q1.
- ¹⁹ North, Dan (economist at Euler Hermes), quoted in Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- ²⁰ Bloomberg News. "U.S. firms in China say their No.1 fear is rising labor costs." *Minneapolis Star Tribune*. March 30, 2013. www.startribune.com/business/200750181.html?refer=y.
- ²¹ Plumer, Brad. "Back to 'Made in America'?" *Washington Post*. May 1, 2013.
- ²² Birnbaum, Michael. "European industry flock to U.S. to take advantage of cheaper gas." *Washington Post*. April 1, 2013. http://articles.washingtonpost.com/2013-04-01/world/38182416_1_natural-gas-shale-gas-basf.
- ²³ Kaskey, Jack. "Shale May Spur \$30 Billion of Chemical Plants, Lashier Says." *Bloomberg*. March 6, 2012. <http://www.bloomberg.com/news/2012-03-06/shale-gas-may-spur-30-billion-of-chemical-plants-lashier-says.html>.
- ²⁴ For example, see Casselman, Ben. "Women Miss Out on Manufacturing Gains." *Real Time Economics, Wall Street Journal*. March 26, 2013. As discussed later in this report, women's employment has increased in several manufacturing subsectors since February 2010; however, the total number of female manufacturing employees has declined since then. <http://blogs.wsj.com/economics/2013/03/26/women-miss-out-on-manufacturing-gains>.
- ²⁵ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES. Data through March 2013.
- ²⁶ National Women's Law Center. *Still No Recovery for Women in the Manufacturing Sector: Manufacturing Employment Trends for Women and Men, 2008-2013*. March 2013. www.nwlc.org/sites/default/files/pdfs/manufacturing_employment_trends_2008-2013_fs.pdf.
- ²⁷ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES.
- ²⁸ Statistics in this section are from JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES.
- ²⁹ JEC Democratic staff calculations based on data from the Bureau of Labor Statistics, CES and CPS. Calculation results in 27% using data from CES as of April 2013, and 29% over

³⁸ Catalyst, *The Bottom Line: Corporate Performance and Women's Representation on Boards* (2004-2008). 2011. www.catalyst.org/knowledge/bottom-line-corporate-performance-and-women%E2%80%99s-representation-on-boards-2004%E2%80%932008.

PREPARED STATEMENT OF HON. KEVIN BRADY, CHAIRMAN, JOINT ECONOMIC
COMMITTEE

I would like to thank Vice Chair Klobuchar for choosing the topic of today's hearing, "Women in Manufacturing."

As we have discussed with particular focus in this Congress, the United States suffers from an economic growth gap, and manufacturing is no exception. This recovery remains the weakest since World War II. We still have \$1.2 trillion less in real GDP and 4.1 million fewer private sector jobs than in an average post-war recovery.

Every Member of Congress agrees on the importance of manufacturing. In 2012, manufacturing contributed \$1.87 trillion to the economy. In April 2013, 12 million Americans were directly employed in the manufacturing industry. According to the National Association of Manufacturers, taken alone U.S. manufacturing would be the 10th largest economy in the world.

After rising for several decades, the percent of women employed in manufacturing peaked at 32.3 percent in the early 1990s. The percentage of women employed in manufacturing has subsequently declined to 27.3 percent. Notably, this decline has been seen for both genders: manufacturing jobs for women have declined to just 5 percent of total nonfarm payrolls for women, and to a mere 6 percent of total nonfarm payrolls for men.

In context of the economy at large, manufacturing has been shrinking as a portion of the economy both in terms of GDP and employment, and yet labor productivity in this industry has outpaced the rest of the economy. American manufacturers are the most productive in the world, far surpassing the worker productivity of any other major manufacturing economy, leading to higher wages and living standards. Manufacturers in the United States perform two-thirds of all private-sector R&D in the nation, driving more innovation than any other sector.

So why has the percentage of women employed in manufacturing declined? Is this a function of the changing composition of goods manufactured in the United States or a mismatch in skills versus available jobs, or other factors? And what role should the federal government play in addressing these answers?

Going forward, most of manufacturing jobs require advanced skills and higher education. Between 2000 and 2011, manufacturing employment has increased by more than 10 percent among workers with more than a bachelor's degree. This compares to the approximate 25 percent decline in employment among manufacturing workers overall.

Women are indeed surpassing men in attaining additional skills and post-secondary education and beyond. The gender gap in education has closed since 2000 in the manufacturing workforce, and as of 2012, 28 percent of women in manufacturing hold a four-year college degree or higher, compared to 29 percent of men.

However, women currently remain underrepresented in science, technology, engineering, and mathematics, representing 46.5 percent of total employed in those fields. A study by the American Association of University Women found that most women in STEM fields are biological scientists, chemists, and environmental scientists rather than in other STEM fields that directly relate to most forms of manufacturing.

Over time, increasing the number of women receiving degrees in STEM fields that directly relate to manufacturing will increase the number of women employed in manufacturing. We should remove any obstacles that discourage women from majoring in as undergraduates and seeking advance degrees in these fields.

Furthermore, many high schools, universities, and manufacturing firms are proactively encouraging women to pursue education and training in manufacturing with high school partnerships and internships, reaching out to women on campus, and focusing on career training for women.

Critical to employing more women in manufacturing is ensuring that the United States remains an attractive place for manufacturers to do business.

The keys to a strong manufacturing sector include pro-growth tax reform; balanced regulation; a sound dollar; abundant, affordable energy distributed across the country, with the help of the Keystone XL and other pipelines; and a reduction of health care costs that impede employers from hiring.

I hope the witnesses can shed light on the trends of women in manufacturing going forward, what's been working best to attract women to high-skill manufacturing and other STEM fields, as well as broadly identifying best practices for the continued success of the manufacturing industry in America.

Ms. Jennifer M. McNelly, President of the Manufacturing Institute, will tell us about the initiatives that her organization is undertaking to help women pursue careers in manufacturing.

Ms. Darlene M. Miller, the President and CEO of Permac Industries, will discuss “Right Skills Now,” a cooperative program with community colleges to credential women with skills needed by manufacturers.

Finally, Mrs. Amy Jolley, Vice President of Tax for Noble Energy, who is from my home state of Texas, will inform us of the opportunities for women in the booming energy production sector.

I look forward to hearing the testimony of the witnesses.

PREPARED STATEMENT OF JENNIFER MCNELLY

Chairman Brady, Vice-Chair Klobuchar, and distinguished Members of the Committee, thank you for the opportunity to appear today to testify on behalf of The Manufacturing Institute at this hearing on “Women in Manufacturing.”

My name is Jennifer McNelly, and I am the President of the Manufacturing Institute. We are the non-profit affiliate of the National Association of Manufacturers (NAM) and we are the authority on the attraction, qualification, and development of world-class manufacturing talent.

A recent survey from Deloitte and The Manufacturing Institute found that over 80 percent of American manufacturing companies have a moderate to severe shortage of available, qualified workers. Manufacturing companies cannot fill as many as 600,000 skilled positions, even as unemployment numbers hover at historically high levels. Meanwhile, there’s one obvious source of human capital that the manufacturing industry has not fully tapped: women. Across all manufacturing sectors in the U.S., women are underrepresented in the workforce. While women represent nearly half (46.6 percent) of the total U.S. labor force, they only comprise a quarter (24.8 percent) of the durable goods manufacturing workforce. The proportion of women in leadership roles in manufacturing companies also lags behind other U.S. industries.

In 2012, Deloitte and The Manufacturing Institute set out to understand why manufacturing isn’t attracting, retaining, and advancing its fair share of talented women. We surveyed more than 600 women in manufacturing, across functional roles and levels, to gain their perspectives on how effectively their companies recruit, retain, and advance women. We conducted one-on-one interviews with more than a dozen women in a range of roles from senior leadership to individual contributors to gain their insights on human capital and talent development in the manufacturing industry.

Today I would like to highlight two of the most consistent responses given by the women interviewed: sponsorship and personal development.

SPONSORSHIP

Women who were successful in manufacturing often looked at their career choices and credited a sponsor for undertaking responsibility for their development and professional progression. A sponsor extends beyond mentoring and coaching to being a vocal advocate, thereby enhancing their sponsor’s presence in the organization. Recent research shows that individuals who have the active support of sponsors within their organization are more likely to advance in their careers. Sponsorship confers a statistical benefit of up to 30 percent in terms of more stretch assignments, promotions, and pay increases.

To encourage this goal, this year The Manufacturing Institute sponsored the first annual Science, Technology, Engineering and Production—STEP—awards to celebrate women in manufacturing. The STEP initiative this year honored 122 women—from the front-line to the C-suite from manufacturing companies of all sizes and all across the country—who have demonstrated excellence and leadership in their manufacturing careers. We were able to celebrate exciting careers in and continue to ensure new opportunities for women in the manufacturing industry. Women in manufacturing need, and our Honorees are, successful role models to empower today’s current manufacturing leaders to help inspire the next generation of leadership and talent.

We have one of our own STEP Honorees with us today to share her story, Darlene Miller from Permac Industries, located in Minnesota. Darlene is one of these impressive 122 Honorees. Many of our other STEP Honorees, just like Darlene, have served as exceptional leaders in the manufacturing industry.

For example, Natalie Genova, Senior Project Manager, Integrated Supply Chain at Honeywell International, has not only served as a leader in the manufacturing industry, creating a best-in-class training, onboarding and leadership development program, but she advocates for and participates in mentorship programs. Natalie frequently attests to the importance of mentorship, supported by her own mentoring

relationship she had with her supervisor, DonnaLee Scaggs. The impact this relationship had on Natalie has led her to serve as a mentor herself, recognizing that it is a critical component to building the company's talent pipeline.

PROMOTE PERSONAL DEVELOPMENT

In addition to powerful mentors and role models, women also cited professional development as a priority for success. Successful manufacturing organizations today provide potential talent with a clear understanding of the behaviors, capabilities and experiences required for roles and positions and help talent build out an experiential-based development plan. This should include: identifying the challenging assignments, roles and experiences that will help them close the gaps, and providing them with the opportunity and backing to take on these stretch assignments.

To that end, The Manufacturing Institute identified a series of nationally portable, industry-recognized credentials based specifically on employer-identified skills. These credentials, in use by companies across the country, clearly lay out the training required to certify that an individual possesses the basic skills necessary for a career in manufacturing. By clearly identifying the next level of success through a credential and training, employees are aware of exactly what is necessary for advancement and success.

In fact, one of our own STEP Honorees is one of the most certified welders in the industry today. Karen Gilgenbach, Weld Process Specialist for Airgas USA, LLC in Milwaukee, Wisconsin, is a Certified Welding Supervisor and a Certified Robotic Arc Welding Technician, both offered through the American Welding Society. Karen pursued additional training and education to achieve these certifications to not only increase her skill set, but to also validate her skill set.

Much of this training is done through community and technical colleges—education platforms that are uniquely situated to provide this type of training. This also supports more on and off ramps in education, which facilitates an individual's ability to obtain schooling when their professional career requires it and also positions them to earn while they learn, applying what they learn in class at night on the job the next day. For many years, postsecondary success was defined as a four-year degree, whereas a valid, industry-based credential can provide the knowledge and skills for a well-paying job and a solid middle-class lifestyle, establishing a strong base with a potential to grow.

CONCLUSION

Manufacturers across the country are beginning to realize that women are an untapped resource. However, retaining and nurturing that skilled talent can be a challenge in a traditionally non-female work environment. Our research has shown that identifying sponsors as well as providing clear career training pathways vastly improves retention and success opportunities for women in manufacturing, and I hope that we can work with you in the future to promote these goals.

Thank you for the opportunity to testify today. I look forward to working with you to build the next manufacturing workforce generation.

PREPARED STATEMENT OF DARLENE MILLER

Thank you Congressman Brady and Senator Klobuchar for inviting me here today and for giving me the opportunity to present my own views on manufacturing to include the importance of encouraging more women into this field.

My personal experience comes from owning a precision machining job shop since 1993/94. I left the corporate world in 1992 based on a handshake from the then current owner of Permac Industries to take the position of outside sales. Was I scared—yes—but ready for a new opportunity especially given the fact the current owner where I had been employed for thirteen years had stated “women” do not need to earn as much as men ... What I didn't know at the time was Permac Industries was in serious financial trouble with their bank. When this was brought to my attention—I truly believed I could turn the company around and therefore purchased 45% within nine months and the balance less than nine months later.

I got great advice from my new bank—the president chose to mentor me which was so helpful! He told me—“always surround yourself with smarter than average people” and “pay them a little more than the norm.” Truly I believe without having this man as a mentor, I might not have been nearly as successful. He helped me to believe I could. It didn't matter to him I was a woman in a male-dominated field—it wasn't about that—it was all about skill and talent and passion to learn. He also helped me continuously to grow beyond my comfort zone. At his retirement

party, I found out I was one of many he helped. This support and mentorship—be it from a man or a woman—I believe is truly needed to help women become successful especially in male-dominated fields.

Manufacturing has been very rewarding and exciting for me. We at Permac make very cool and difficult parts. These components go into airplanes, medical devices, submarines, robots, food and beverage items, and yes even on motorcycles—just to name a few industries we serve!

My company started with 7 people, 7,000 square feet, \$700,000 in sales and today we are 34 people, 34,000 square feet and close to 5 million in sales. We continue to innovate and practice lean and stretch beyond our original core skills by hiring women and men in positions such as assemblers, clean room specialists, machinists, purchasing managers, quality technicians and managers, human resource managers, accounting managers, and inside and outside sales persons! We believe a good mix of women and men in our company utilizes everyone's skill sets to the maximum plus we do not want to leave any talent source untapped.

I have hired those "smart" women and men the bank president suggested and together we have won numerous awards together such as the SBA Small Business Person of the Year Award for the State of Minnesota, 2008 U.S. Chamber Small Business of the Year for the entire U.S. along with many others! We are always "pushing" ourselves to be the best and my employees deserve the credit and recognition for going above and beyond every single day!

Due to these recognitions, I was chosen to serve on the Presidents Council for Jobs and Competitiveness in 2011–2012. We at Permac had difficulty filling CNC machinist's positions for the last 20 years and in fact had actually searched for a CNC Swiss machinist for over two years before finding a skilled candidate to fill the position. Unfortunately, skilled positions in our company and in many of my colleagues companies remain unfilled for months which adversely affect our ability to grow and manufacture more products. I now had the opportunity to help create a change. Having the honor of co-chairing the High Tech Education sub-committee, I created a program properly named Right Skills Now by partnering with NAM, NIMS, ACT, PMPA and two colleges in Minnesota. RSN is a 24 week—fast track—stackable credentialed program with 16 weeks classroom/lab and 8 weeks internship to train men and woman to become CNC Machinists. I am proud to say this program is constantly expanding—now in 8 states and approximately 15 schools and continues to grow weekly! Our success rate in Minnesota is 99% for continued employment after the 24 weeks and nationally it is 91% for job placement and/or continuing education! Permac employs three of these students and will continue to hire them as they graduate RSN and encourage continued education. A Get Skills to Work program was developed based on RSN for returning veterans and their families with plans to roll out in 10 cities in 2013. Amazing to think by working in partnership with our trade associations such as PMPA and our colleges, we can make such a huge difference in manufacturing as these men and women in many cases had no concept of what a manufacturing job was all about—other than the fact 600,000 jobs openings exist today.

As a woman leader in Manufacturing, I have a passion to encourage others into the manufacturing field. Recently I spoke at an event where high school seniors from several schools attended to learn about manufacturing. I left them with this message. We females actually have an advantage in our industry. We think differently. Critically. Our asking why leads to improvements and efficiencies in our processes. Our attention to detail helps minimize mistakes and our passion helps keep everyone motivated and working towards the same goal. I also explained how manufacturing is not dark, dirty and dangerous and how we all need to change the perception that being an engineer or in manufacturing is for girls too. It's exciting that we now have more women graduating colleges than our male counterparts but we need to start earlier with the introduction of these career paths. I also told the story of when I took ownership of my company, our Quality Director decided to leave the company as he stated "a woman could never make it in this business." Well I guess I proved him wrong. I encouraged these young women to also prove they could!

I feel it is critical that I help mentor women and girls to help them realize they can excel in any career they choose and try to drive away the stereotypical thoughts that some of the jobs are only for men! I personally became involved in a mentoring program named Hope for Tomorrow for 8th and 9th grade girls in 1998 and after a couple years mentoring, determined we needed to expand into more schools to help make a difference in additional girls' lives. Under my year as Board Chair, we grew to 13 schools, obtained our 501C3 status and created a defined curriculum and toolbox to help expand their horizons and to help them to understand—their journey is what they make of it and they are capable of any career. We explain our roles

and careers and expose them to many career choices they didn't even know exist. We encourage them to believe they are more capable than they ever thought they were and in encouraging and mentoring them—so they flourish! One young woman I personally mentored had decided early in our sessions she would not go on to higher education of any sort as her culture typically dictates getting married right after high school. We were coming back from a field trip after a college visit and she said staring straight ahead and very positively—"I can do this—I can go to college—I can be what I want to be and I am going to!" The feeling of knowing I had changed one person's life to a better path is experienced by many of our mentors every year but every time it happens it feels more wonderful than the last! This mentorship continues throughout high school and the mentees come back to mentor others. Really it is simply exposing girls to all opportunities to include manufacturing!

I will close with a quote I truly believe in by Margaret Mead—"Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has." It only takes one person to make a difference in a person's life and I will always try to make that difference!

PREPARED STATEMENT OF AMY JOLLEY

Good morning, I am Amy Jolley, Vice President of Tax for Noble Energy, Inc. Thank you for the invitation to participate in this discussion about the role of women in the U.S. manufacturing sector.

BACKGROUND ON NOBLE

Noble Energy is a Houston-based independent oil and natural gas exploration and production company with a market capitalization of approximately \$20 billion. Last year we celebrated our 80th anniversary. We have roughly 2,500 employees and produce approximately 250,000 barrels of oil equivalent per day from our operations around the world. In 2012, our annual revenues totaled \$4 billion.

At Noble Energy, we operate in five core areas. In the United States, we operate in the Marcellus Shale of West Virginia and Pennsylvania, the DJ Basin in Colorado, and the deepwater Gulf of Mexico. Our international operations include offshore Israel and Cyprus in the Eastern Mediterranean, where we have discovered approximately 37 trillion cubic feet of natural gas resources, which has the potential to provide both Israel and Cyprus with energy independence for decades to come; and offshore Equatorial Guinea and Cameroon in West Africa. We have a very active exploration program; domestically we are exploring a new region in Nevada as well as several international locations. In 2013 our capital spending program is expected to be nearly \$4 billion—nearly two-thirds of which will be spent in the U.S.

THE MANUFACTURING SECTOR

You may be curious about the connection of the upstream oil and gas industry with a classic manufacturing model. Although the industry may not be designated as manufacturing by virtue of converting raw materials into finished goods, in some ways upstream exploration and production activities do constitute a form of manufacturing, and in other ways there is significant overlap between manufacturing and extractive industries. Having worked in a manufacturing environment for several years, I have noted many similarities in terms of the challenges facing both the manufacturing and extractive industries in the financial, operational, and human resources areas.

Significant technological advances have allowed the onshore oil and gas industry, as a whole, to reinvest its capital and human resources for the recovery of hydrocarbons from American basins. But to access these hydrocarbons, oil and gas companies frequently follow manufacturing, or assembly line, concepts to drill and complete an increasing number of wells. As most are aware, a manufacturing environment is conducive to a standardized costing approach. As processes become more homogenous, safety performance improves, efficiencies increase, and costs become standardized. In the upstream oil and gas business, we try to capture the same benefits.

In the operational arena, domestic exploration and production companies and manufacturing enterprises have several functions in common. Research and development, or product development, is comparable to gathering seismic data, and drilling exploration and appraisal wells. The sectors share the same considerations with respect to procurement, which involves inventory management, supply chain and logistics. For example, we must purchase and store huge amounts of pipe, casing, tubing and wellheads for our Gulf of Mexico, Colorado, Pennsylvania and West Virginia

operations. The oil and gas field manufacturing process consists of installation, development, and production. Logistics and distribution may comprise a separate function, or may be contained with marketing, another function that operates in a similar way in both sectors.

The exploration and production industry faces the same challenges as traditional manufacturing in regards to recruiting, hiring and retaining highly skilled employees needed to run cost-efficient businesses. Earlier I mentioned Noble Energy's rapid growth. Of our 2,500 employees, nearly 400 were added in 2012 alone and we have a similar growth profile anticipated for 2013. As we expand, we continue to hire outstanding employees, including both experienced individuals and new collegiate and high school graduates throughout multiple disciplines—technical, operational, informational technology, financial, and marketing. Because we are an exploration company, we must attract the highest level of talent in the science, technology, engineering, and mathematics in order to maintain our commitment to excellence. For Noble, this means hiring various types of engineers (petroleum, mechanical, reservoir) and geoscientists (geophysicists, geologists, petrophysicists), oil and gas economists, and land administrators. To further ensure enterprise-wide success, that same caliber of employee must be in place in the support functions required to run a successful business such as legal, finance and information technology.

Within Noble Energy, our new employees interact with experienced mentors and managers as well as with senior and executive management, engaging in project assignments, on-the-job projects, and continuing education through e-learning and virtual classroom training. Noble is motivated by investing in its employees, and offers various development programs both within and across disciplines, including a "Learn, Excel, Achieve, Develop" (or LEAD) program, an accelerated leadership track. I'm involved in the latter, and have a female mentee who has entered the operational space. It is an amazing opportunity for both of us to share multi-functional experiences and learn new facets of the business.

ATTRACTING TOP TALENT

In order to maintain access to top talent, we have strong recruiting and internship programs with key colleges and universities in our domestic core areas. To capture the attention of these individuals, the courtship must start early in their academic careers. We involve ourselves in the K-12 curriculum to encourage students and help them realize what opportunities are available. For example, we have been involved at the high school level through the Junior Achievement "Company Program," which requires students to engage in an entrepreneurial activity, and participate in "Finance Park," which is focused on teaching high school students career and life skills. We are heavily involved with Junior Achievement in the Houston area. We are in the fifth year of our partnership with Junior Achievement and our Chief Operating Officer, Dave Stover, is on the Houston Board of Directors.

The number and percentage of females in managerial and professional roles has been increasing at Noble Energy over the past few years, and much can be attributed to the larger number of females enrolled in the technical disciplines at the universities and colleges where we recruit. As Noble Energy continues its growth, it will continue to focus on ensuring that the critical level of talent is met regardless of gender, but as the number of females with technical degrees continues to increase, there will be an inherent increase in the number of females in such roles within the company. We tend to recruit at a small number of core schools within each of our key disciplines, and we are noticing a shift in the number of female graduates within the technical geoscience and engineering disciplines. Noble Energy is currently bimodal—that is, we have a large number of employees who are either in the first few or last few years of their careers. When we compare the groups, there is a significant difference between the gender and ethnic diversity in the experienced group nearing retirement and the new employees. As an example, our summer interns are starting to arrive. This week's group of geoscience interns consisted of three students, two of which are female.

As I think of my own role within the company I realize that 15 or 20 years ago, it would have been unlikely for a female to hold my current position. That being said, last week I attended a Houston area Chief Tax Officers Forum, and of the attendees, females held the top tax position within approximately 25% of local companies. That number was approximately 10% just 3-4 years ago, so progress is being made.

For me, the key to increasing the gender mix across the board in the manufacturing sector is to actively inform students of skills required to take advantage of great employment opportunities that exist in these exciting job fields.

As a child growing up in rural Iowa, my own parents always led me to believe I could do anything I wanted. However, I'm not sure I necessarily knew what those choices actually looked like. For example, I didn't know what an engineer was, let alone the differences between a chemical engineer, a mechanical engineer, and a petroleum engineer. That was an Internet age ago, but my own personal philosophy is that there are still plenty of girls out there who do not have sufficient exposure to the types of careers available and the skills needed in order to qualify for those jobs.

As a mother, I want work options that make life easier for me and my family and other two-career families. As a part of its growth endeavor, Noble Energy is evaluating and implementing programs and tools that will enhance employees' flexibility, which tends to enhance productivity and job satisfaction. Many Noble Energy employees will be moving to a new headquarters this summer. We are partnering with the nearby YMCA to provide extended day care next door to the new facility, and will also have onsite food service that will offer takeout options for family meals—a great convenience for two-career families who are often stretched by the end of the day. With these steps and others such as flex time and a focus on work-life balance issues, Noble Energy is making a positive difference in the lives and careers of all of its employees.

Having companies actively participate in educational outreach can demonstrate the range of careers options available so children can pursue targeted educational opportunities. The more opportunities we can get in front of our kids, the more we can show them how they can bring productivity and economic success to themselves, their families, their employers and the United States. I am the mother of two young children—a five year old boy and a three year old girl. I want them both to understand that the range of opportunities is nearly limitless, but also to provide them concrete examples of what their choices might be with the talents they have.

That concludes my remarks. Thank you again for the opportunity to participate here today.

