

Sen. Amy Volk, Chair  
Sen. Rodney L. Whittemore  
Sen. John L. Patrick  
Rep. Robert Saucier, Chair  
Rep. Craig Hickman  
Rep. Stacey Guerin

Christy Daggett  
James Detert  
Sharon A. Treat  
Dr. Joel Kase



John Palmer  
Linda Pistner  
Harry Ricker  
Randy Levesque

*Ex-Officio*  
Wade Merritt  
Pamela Megathlin

*Staff:*  
Lock Kiermaier

STATE OF MAINE

## Citizen Trade Policy Commission

---

### **DRAFT AGENDA**

Wednesday, April 6, 2016 at 1 P.M.  
Room 437, Maine State House  
Augusta, Maine

- I. Welcome and introductions
- II. Review of 2/1/16 letter from Maine Center for Economic Policy to US International Trade Commission on TPP's likely impact to US economy; copy provided to CTPC
- III. Discussion and final decision on topic and author for 2016 CTPC Assessment; final candidates are the Institute for Agriculture & Trade Policy/Maine Farmland Trust and The Margaret Chase Smith Policy Center, University of Maine
- IV. TPP perspective- Presentation by Ms. Cynthia Johnson, Senior Advisor, Texas Instruments (2 PM)
- V. TPP perspective- Presentation by Mr. Nolan Barkhouse, Lawrence S. Eagleburger Fellow, P&G Global Government Relations and Public Policy, Proctor & Gamble (2:30 PM)
- VI. Articles of Interest – Lock Kiermaier, CTPC staff

**Note: agenda order and times of presentation are subject to change.**

Citizen Trade Policy Commission  
c/o Office of Policy & Legal Analysis  
State House Station #13, Augusta, ME 04333-0013 Telephone: 207 287-1670  
<http://www.maine.gov/legis/opla/citpol.htm>

1



February 1, 2016

Lisa R. Barton  
Secretary to the Commission  
United States International Trade Commission  
500 E Street, SW  
Washington DC 20436

RE: Investigation No. TPA-105-001

Dear Madame Secretary,

Thank you for the opportunity to submit written comments on the proposed Trans-Pacific Partnership (TPP) Agreement's likely impact on the U.S. economy.

The Maine Center for Economic Policy is a nonprofit, non-partisan policy research organization. We provide citizens, policymakers, advocates, and the media with credible and rigorous economic analyses to help Maine people prosper.

We submit testimony today because trade agreements like the TPP detract from the economic stability of Maine's hard-working families. Specifically they exacerbate wage and income inequality that forces tens of thousands of Mainers into poverty.

According to Public Citizen, a nonprofit advocacy organization,

Since 1941 standard economic theory has held that trade liberalization is likely to contribute to greater income inequality in developed countries like the United States. As direct competition with low-wage labor abroad puts downward pressure on middle-class wages, the profits of multinational firms rise, and the income gap between the rich and everyone else widens.<sup>1</sup>

Public Citizen goes on to say,

In the early 1990s, as U.S. income inequality soared amid the enactment of U.S. "free trade" deals, a spate of economic studies...[aimed] to determine the relative contribution of trade flows to the rise in U.S. income inequality. **The result was an academic consensus that trade flows had, in fact, contributed to rising U.S. income inequality. The only debate was *the extent* of trade's role, with most studies estimating that between 10 and 40 percent of the rise in inequality during**

Board of Directors

Steve Ward, Chair  
Sandra Butler  
Pamela Cox

Lynn Davey, Vice-chair  
Scott Cuddy  
John Dorrer

Lock Kiermaier, Secretary  
Karen Heck  
John Piotti

Chip Newell, Treasurer  
Sarah Shed  
Lee Webb

2

the 1980s and early 1990s stemmed from trade flows, as indicated in the table below.<sup>2</sup>

In Maine we have seen the growing disparity between high- and low-wage workers firsthand.

Wage growth for the median Maine worker began to stagnate in the late 1980s. The median wage didn't grow at all over the past decade and has grown by less than a dollar since 1990. Meanwhile, the highest wage earners have seen relatively steady income growth over the past 30+ years, and the top 10% of wage and salary earners experienced a 12.4% increase in real wages between 2002 and 2012.<sup>3</sup>

Income inequality in Maine is growing too. Between the late 1970s and the mid-2000s, the average income for the poorest fifth of Maine households grew just 27%, from \$18,720 to \$23,825. Middle-income households fared slightly better, with average household income for the middle fifth of Maine households growing 47% over the same period. The top 20% of Maine households, meanwhile, saw their average income grow 67%.<sup>4</sup>

As trade flows are liberalized, Maine manufacturers, like our paper mills, are unable to compete with companies in countries with lax or nonexistent labor protections and, consequently, low-wage labor. In Maine, since 1990 the manufacturing sector has shed more than 40,000 jobs, almost half the state's manufacturing employment, to be replaced with service jobs. Most jobs in the service-providing sectors of the economy pay lower wages and offer fewer benefits than many of the earlier factory jobs.<sup>5</sup>

Today with low-paying jobs as their only option, one-third of Maine families fall under 200% of the federal poverty level and are unable to provide for their basic needs: food, clothing, heat, health care, and housing.<sup>6</sup>

Maine's emblematic fishing industry provides one example of how the TPP agreement will contribute to job loss and further increase wage and income inequality. The TPP will reduce or eliminate trade barriers on fish and seafood imports from New Zealand, Vietnam, and other TPP countries. As a result, Maine fishermen will be forced to compete with fishing vessels that use forced labor, with aquaculture producers that use chemicals and antibiotics banned in the U.S., and with seafood processors with less regulatory oversight.<sup>7</sup>

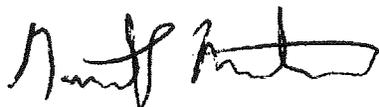
With the increasing cost of fuel, gear, and bait, the threat of shell disease and warming waters, and the risk of drowning from high waves or entanglement in trap lines, Maine's fishing families already live precariously on the edge. Unfair competition from TPP countries will put them out of business and out of a livelihood. Deep cuts or even the loss of our fishing industry would not just be a blow to Maine's economy, but to our heritage and culture.

We understand that the purpose of the TPP trade agreement is to promote economic opportunity across world boundaries. But this agreement will make it easier for U.S. companies to shift production overseas, exploit the less rigorous labor and environmental standards in

those trade partner countries, and pay lower prevailing wages to their workers abroad. It will make wage and income inequality worse both domestically and internationally.

I urge you to consider the economic downsides of removing tariffs and trade barriers on imports and the resulting degradation of jobs and wages in Maine.

Sincerely,



Garrett Martin  
Executive Director

cc: Hon. Senator Susan Collins  
Hon. Senator Angus King  
Hon. Representative Chellie Pingree  
Hon. Representative Bruce Poliquin  
Maine Citizen Trade Policy Commission

---

<sup>1</sup> Public Citizen. Studies Reveal Consensus: Trade Flows during "Free Trade" Era Have Exacerbated U.S. Income Inequality, August 20, 2015.

<sup>2</sup> Ibid.

<sup>3</sup> Maine Center for Economic Policy. The State of Working Maine, 2013, November 2013.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Working Poor Families Project. Analysis of 2013 American Community Survey microdata. Available at <http://www.workingpoorfamilies.org/indicators/>, Accessed January 27, 2016.

<sup>7</sup> Treat, Sharon Anglin. Impact of the Trans-Pacific Partnership (TPP) on the Environment, Climate, and Healthy Food. A Briefing for Attorneys and Policy Staff, Augusta, ME, January 19, 2016.





Sen. Amy Volk, Chair  
Sen. Rodney L. Whittemore  
Sen. John L. Patrick  
Rep. Robert Saucier, Chair  
Rep. Craig Hickman  
Rep. Stacey Guerin

Christy Dagggett  
James Detert  
Sharon A. Treat  
Dr. Joel Kase



John Palmer  
Linda Pistner  
Harry Ricker  
Randy Levesque

*Ex-Officio*  
Wade Merritt  
Pamela Megathlin

*Staff:*  
Lock Kiermaier

STATE OF MAINE

## Citizen Trade Policy Commission

---

### 2016 CTPC Assessment Selection Process

The Maine Citizen Trade Policy Commission has selected two final candidates for consideration to write the 2016 Assessment. Each candidate is asked to submit the following documents:

- A synopsis of no longer than 2 one-sided pages which describes a proposed topic (s) for the 2016 CTPC Assessment. While not required, given the impending Congressional vote on the TransPacific Partnership (TPP), it is suggested that a proposed topic(s) focus on some aspect(s) of the possible effects of the TPP on Maine. The synopsis should clearly identify a proposed topic(s) with a brief description of how the assessment would be constructed;
- An organizational vitae not to exceed one page in length which briefly describes the organization and its qualifications, resources and experience that are pertinent to being able to complete a meaningful and useful Assessment.

These documents must be sent to CTPC Staff person Lock Kiermaier no later than Tuesday, March 29, 2016. Upon receipt of the documents, Mr. Kiermaier will circulate them to CTPC members for their review and consideration. It is anticipated that a final decision on who will write the 2016 Assessment will be made during the CTPC's next meeting on Wednesday, April 6, 2016.

Once a final author has been selected, a contract will be drawn up which will specify a number of requirements and a timetable for completion of the Assessment. Assuming that the CTPC makes a final selection during its April 6<sup>th</sup> meeting, it is anticipated that the Assessment will need to be completed by a yet to-be-determined date in the early fall of 2016.

Previous Assessments commissioned by the CTPC can be viewed at:  
<http://legislature.maine.gov/legis/opla/citpolassessments.htm>

Questions should be addressed to CTPC Staff person Lock Kiermaier.

Citizen Trade Policy Commission  
c/o Office of Policy & Legal Analysis  
State House Station #13, Augusta, ME 04333-0013 Telephone: 207 287-1670  
<http://www.maine.gov/legis/opla/citpol.htm>

5





**INSTITUTE FOR  
AGRICULTURE AND TRADE POLICY**

March 29, 2016

Dear Members of the Maine Citizens Trade Policy Commission,

Thank you for the opportunity to present our ideas for your 2016 Trade Policy Assessment. In 2014, the Institute for Agriculture and Trade Policy (IATP) and the Maine Farmland Trust (MFT) wrote an assessment of the potential impacts of the Transatlantic Trade and Investment Partnership on Maine's food and farm systems. We found the process of preparing and presenting the 2014 Assessment to be very useful in our own work. It was a pleasure to use our expertise to serve the Commission and the state of Maine.

The 2014 Assessment focused on the potential impacts of the Transatlantic Trade and Investment Partnership (TTIP) on Maine's food and farming sectors. That agreement is still under negotiation, however, after years of negotiations the Trans Pacific Partnership (TPP) has been completed and the agreement has been signed. Legislatures in the 12 countries are now considering the potential impacts of the accord on their economies and environments. In the U.S., while it is possible that a vote could occur in Congress sometime in the next few months, it appears that the controversial nature of the agreement will effectively push a vote until after the November elections.

The TPP, if approved, could have significant impacts on local and national economies in the member countries. It will be important to look at the combined effects of various provisions in the agreement on key sectors of Maine's economy. We would begin with an overview of the current structure of U.S. agriculture and changes in agricultural imports and exports resulting from past trade agreements. We would also include a brief overview of the agricultural sector in Maine.

We would focus our analysis of the potential impacts of the TPP on three issues:

- **Potential changes in the dairy sector.** The combination of changes in tariffs and food safety standards could affect production and prices of both conventional and organic dairy products in Maine. During the negotiations, there were projections that the U.S. would dramatically lower tariffs on dairy products, including Milk Protein Concentrate, in exchange for the dismantling of Canada's dairy supply management program and other export opportunities. While it appears the actual changes were less dramatic than initially proposed, we would examine changes in the dozens of tariff lines and non-tariff barriers. We would also examine how the likely changes in imports and prices would affect prices under the Federal Dairy Program and Maine's Dairy Price Support program, the latter of which relies on a balance of supply and demand within the state.
- **Seafood sector.** We would examine likely changes in tariffs and non-tariff barriers here and abroad, both for goods exported from Maine (such as lobster) to TPP countries and for goods that would likely be imported (such as shrimp from Vietnam). In the case of

exports, we would consider the record of market opening under past trade agreements, as well as indications of which TPP countries might be open to Maine's seafood exports. We would also document the views of environmental and fisheries organizations on the sustainability of these market openings. In the case of imports, we would analyze the projections of imports and related regulatory changes in the TPP that could ultimately affect food safety.

- **Local foods programs.** We would review recent local foods legislation and programs (such as GMO labeling, limits on pesticides, local foods procurement programs and proposals to enhance food sovereignty) in Maine and neighboring states and describe how TPP that could affect the implementation of those programs.

Even before the TPP negotiations were completed we were able to gather substantial information on likely provisions and areas of concern for food and farming systems. Now that it has been completed, it is imperative to examine the actual text and raise any concerns with decision makers before a vote takes place in Congress. IATP and the Maine Farmland Trust would welcome the opportunity to prepare the 2016 Trade Policy Assessment and work with the Commission to raise those concerns in Maine and elsewhere.

Sincerely,

Karen Hansen-Kuhn  
Director, Trade and Global Governance  
Institute for Agriculture and Trade Policy

Amanda Beal  
Policy and Research Fellow  
Maine Farmland Trust

## Organizational Profiles

**The Institute for Agriculture and Trade Policy (IATP)** was founded in 1986 as an outgrowth of the family farm movement. Working from local to global, we envision a world of prosperous family farmers, vibrant rural and urban communities, a resilient environment and healthy food for all. Over its 30 year history, IATP has earned a global reputation for insightful, timely analysis of trade proposals and their influence on health, the environment and rural development. Pioneers in global communications, IATP was a key source of information on agriculture and trade policy for World Trade Organization delegates and CSOs, most notably through our publication, the *Geneva Update*. Today, IATP staff is regularly called upon by governments, UN bodies and civil society groups looking for a deeper understanding of such technical issues as trade policy, commodity market dynamics, nanotechnology and food reserve models.

Beyond analysis, IATP creates positive alternatives for small farmers. We have worked with hospitals, public schools and childcare centers to help them source healthy foods from small farmers using sustainable farming methods. We helped launch state and international certification programs for sustainable farming, fishing and forestry. In 1996, we established Peace Coffee, a successful, 100% fair trade organic coffee companies (for-profit subsidiary of IATP). Locally, IATP is perhaps best known for organizing an emergency relief fund for small farmers in the Midwest during the extreme floods of 2007. Through these and many other collaborations, IATP continues to advance its mission.

**Maine Farmland Trust (MFT)** is a statewide organization with over 5,700 members founded in 1999. MFT's mission is to protect farmland, support farmers, and advance the future of farming. MFT undertakes this work through four programmatic areas:

- Farmland Protection
- Farmland Access
- Farm Viability
- Outreach, Public Policy, Research

MFT is a national leader in combining Farmland Protection with Farm Viability. MFT's Farmland Access work includes Maine FarmLink, which has made more links between farmland seekers and farmland owners than any other program of that sort in the nation. In 2010, MFT set an ambitious goal to protect 100,000 acres of farmland and support 1,000 farming families. To date, MFT has protected over 45,000 acres and supported over 500 farm families. In 2015, MFT successfully completed a \$50 million fund-raising campaign. In 2009, MFT received the Maine Association of Nonprofits award as the best run organization in the state. In 2015, MFT was recognized by the Portland Press Herald with one of its inaugural sustainability awards, for its superb efforts and communications.





## **Maine's Economic Stake in the Trans-Pacific Partnership**

Proposal to Maine's Citizen Trade Policy Commission

Prepared by Margaret Chase Smith Policy Center, University of Maine, April 2016

The Trans-Pacific Partnership (TPP) is important, complicated, controversial, and often not well understood. With this in mind, the Margaret Chase Smith Policy Center will create a neutral, evidence-based guide that helps readers judge the TPP for themselves. The report will broadly examine the TPP while focusing specifically on its likely effects on Maine. Although it will study several issues and sectors in detail, the primary emphasis will be on Maine's overall economic resilience in the face of increased trade and new regulations. The report will also use the best research on national economic impacts to estimate the potential impacts on Maine's economy.

The report will include the following sections:

- a neutral guide to the economic issues involved with free-trade agreements;
- a discussion of the major components of the TPP, including a comparison to the North American Free Trade Agreement (NAFTA);
- a summary of Maine's experience with international trade, particularly since NAFTA;
- an assessment of the likely economic impacts of the TPP on Maine, including job losses and gains; and
- a glossary of frequently asked questions about trade with simple, evidence-based answers.

### **A Neutral Guide to the Economics of Free-Trade Agreements**

International trade creates benefits and costs that ripple through an economy in ways both obvious and hidden. Some innovative companies thrive while others suffer. Some people discover new job opportunities while others are made permanently worse off. Economic principles can untangle and make sense of the many potential gains and losses for a state's workforce and economy. An economic guide to trade reveals why states and communities feel trade's impact differently based on their mix of industries, their workforce, and the presence of dominant employers. It also shows how individuals feel the effects of trade differently based on their roles as workers, employers, and consumers.

The guide will examine how the economic benefits of increasing trade are generally dispersed over large populations, while the costs are usually concentrated in specific locations and on relatively small numbers of individuals. This simple insight is useful for understanding contrasting views of free trade and for evaluating tools to redirect some of the net benefits to those who have lost, such as Trade Adjustment Assistance for laid-off workers. It is also useful for evaluating trade protections, which typically impose costs on the population at large to the betterment of a subset of locations and individuals.

### **Understanding the TPP**

Applying the concepts explored above, the report will examine the major components of the TPP free-trade agreement. The TPP covers traditional trade barriers like tariffs and quotas plus newer concerns such as intellectual property rights, investor-state dispute settlement (ISDS), environmental regulations, and labor standards. The report will clearly describe the major

components of the TPP, with special emphasis on parts that are most likely to affect Maine. The report will also compare the TPP to NAFTA, describing how these landmark agreements are both similar and different. NAFTA is an important touchstone for two reasons. First, it was the largest free-trade agreement the US negotiated prior to the TPP and some aspects of the TPP, such as ISDS, have existed within NAFTA for decades. Second, NAFTA is widely referenced by both proponents and opponents of the TPP.

### **Maine's Experience with International Trade: 23 Years After NAFTA**

Evaluating the TPP's impact on Maine requires objective understanding of our current industries, workers, and population. Maine's economy has grown since Congress passed NAFTA in 1993 but growth has been uneven across the state, with some regions even losing residents during that time.<sup>i</sup> Overall, incomes have risen, output has risen, and Maine is exporting more goods than ever before.<sup>ii</sup> The value of Maine's manufactured goods has stayed relatively constant even as the decline of manufacturing jobs that began in the 1970s has continued.<sup>iii</sup> Thousands of laid-off manufacturing workers qualified for Trade Adjustment Assistance, meaning that foreign trade was an important factor in their job loss.<sup>iv</sup> Thousands of other workers did not qualify, meaning that other forces such as technological advances, changing consumer demand, or even domestic competition caused their layoff.

This discussion of Maine's changing economy will illustrate how gains and losses predicted by economic theories play out in real life. Furthermore, understanding how Maine's economy has changed since 1993 is essential for understanding how the TPP's impact may vary from NAFTA's impact.

### **Economic Impacts of the TPP on Maine**

The report will assess which Maine industries, individuals, and communities would most likely gain, lose, or feel no impact if the TPP became law. It will delve deepest into areas of Maine's economy that would benefit or lose disproportionately. Preliminary reading suggests that agriculture, fishing, and footwear will merit special attention, as well as prescription drugs and consumer prices. The report will use the best estimates of national economic effects to construct quantitative estimates of the impacts on Maine's economy. For example, estimates of approximate job losses and gains will be calculated. The potential economic implications of ISDS and intellectual property regulations on activities and policies within Maine and on Maine companies investing abroad will also be investigated.

### **Frequently Asked Questions**

The report will conclude with concise, evidence-based answers to common questions about free-trade agreements in general and the TPP in particular, such as, "Does free trade kill jobs?" Each answer will be indexed to pages of the report where readers can find further detail. The authors will invite commission members to submit questions for this section.

---

<sup>i</sup> U.S. Census Bureau, Population Division, annual estimates of resident population

<sup>ii</sup> U.S. Census Bureau, Current Population Survey, median household income by state; Bureau of Economic Analysis (BEA), state gross domestic product; U.S. Census Bureau, Economic Indicators Division, state exports by NAICS commodities

<sup>iii</sup> BEA, state gross domestic product by industry; U.S. Department of Labor, Bureau of Labor Statistics, state employment by industry

<sup>iv</sup> Burnett, Michael. 2009. The Impact of International Trade on Maine Manufacturing Workers. Maine Department of Labor, Center for Workforce Research and Information. Augusta, ME.

10

The Margaret Chase Smith Policy Center is a nonpartisan, independent research and public-service unit of the University of Maine. We were created in 1989 to continue the legacy of Senator Margaret Chase Smith who served as a model of civil discourse and integrity. Our mission is to inform public policy processes and societal decision-making through timely research and applied public policy activities focused on critical issues facing Maine and the nation. We conduct non-partisan, evidence-based research on significant issues facing Maine and the nation. Our vision is to serve as the state's premier resource for applied public policy research and engagement.

Catherine Reilly deLutio is an independent research consultant who worked at the Margaret Chase Smith Policy Center before serving as Maine's State Economist from 2005 to 2009. In that role, she managed the State Planning Office's Economics and Demographics Program, providing information and analysis to a broad range of Maine policymakers. Her work included assessing the impact of property tax growth limits, the impact of closing Brunswick Naval Air Station, and the potential for using asset-based economic development in Maine. She has served on Maine's Consensus Economic Forecasting Commission, Revenue Forecasting Committee, the advisory board of the New England Public Policy Center at the Federal Reserve Bank of Boston, and the boards of Avesta Housing and the Maine School of Science and Mathematics. She has written policy reports for numerous legislative committees and appointed councils, *Maine Policy Review*, Maine Community Foundation, Maine Compact for Higher Education, Jobs for Maine's Graduates, and Land for Maine's Future. She holds a BA in economics from Loyola College in Maryland and an MA in economics from Fordham University.

Philip Trostel is a Professor of Economics and Public Policy at the University of Maine and has held a joint appointment with the Margaret Chase Smith Policy Center and the School of Economics since 2001. He earned a PhD in economics from Texas A&M University in 1991. Since then he has faculty appointments at North Carolina State University, Hong Kong University of Science & Technology, University of Warwick (England), Dartmouth College, University of Wisconsin-Madison, Colby College, and the New England Public Policy Center at the Federal Reserve Bank of Boston. His research has been supported by grants from the National Science Foundation, American Educational Research Association, Brookings Institution, and many others. He has published numerous articles in leading academic journals. He has also written dozens of policy reports for general audiences, particularly in Maine (e.g., articles in the *Maine Policy Review* and reports for the Maine Community Foundation, Maine Legislature, Maine Development Foundation, Maine Early Learning Investment Group, Maine Compact for Higher Education, GrowSmart Maine).



**Citizen Trade Policy Commission  
Statement of Cynthia Johnson  
Senior Advisor, Texas Instruments  
April 6, 2016**

Senator Volk, Representative Saucier and other members of the Commission, thank you for the opportunity to appear before you to discuss the Trans-Pacific Partnership. My name is Cynthia Johnson and I am here representing Texas Instruments. As you may know TI is headquartered in Dallas, Texas. We design, manufacture and export semiconductors from Texas and also from our wafer fabrication facility in Portland, Maine.

TI is a global semiconductor design and manufacturing company.

- Operating in **35 countries**
- Serving more than **100,000 customers** worldwide
- Offering nearly **100,000 analog ICs and embedded processors**, along with software and tools
- Innovating for **85 years**

TI's South Portland manufacturing facility ("MFAB") is located on a campus established in 1961, which National Semiconductor purchased in 1987. In 2011, TI acquired National Semiconductor, and the South Portland operations. Today, TI employees at the site are engaged in design and manufacturing of 150 diverse analog semiconductor products. Our plant employs over 500 people.

In addition to supporting trade agreements which open markets – we support policies and initiatives that keep us strong here. TI supports supporting funding for basic scientific research programs at federal agencies. Long-term fundamental science research performed at universities and funded by the industry and the federal government is critical to sustaining the pipeline of new discoveries that will fuel the semiconductor industry, our nation's economy and new job creation in America.

TI provides grants and volunteers for STEM programs that work with teachers and students in the classroom. We have a long history of internship programs with the University of Maine and the University of Southern Maine, and most recently with Southern Maine Community College. TI is a valued member of the Greater Portland United Way community and employee pledges with company matching are important to the communities around our facility.

**What does it take to make a semiconductor?**

Even though chips are widely used, how the transformation of simple sand (silicon) into a highly complex chip occurs is less widely known. This short description was developed by Texas Instruments to explain at a high level what takes place in the unique environment where chips are made, the semiconductor fab.

**From Sand to Ingots**

The semiconductor manufacturing process begins with one of the most common elements on earth, silicon. Silicon is found in abundance in sand, but before it is used in semiconductor manufacturing it is refined to be virtually 100% pure. Purity of materials is fundamental to delivering chips that function as intended.

Pure silicon is then heated until it reaches a molten state and a perfectly structured silicon "seed" is then lowered into the molten silicon. The chemical properties of the molten silicon allow a chemical bond to be formed with the seed and a long ingot of solid silicon can slowly be pulled from the silicon as it cools and solidifies around the seed. When the process is complete, the finished ingot exactly mimics the physical characteristics of the original seed material.

The ingot is then carefully sawed into thin wafers the diameter of the ingot, most commonly 200 mm (8-inches) or 300 mm (12-inches) across.

### **Into the Fab**

TI buys its wafers from companies that specialize in manufacturing the silicon ingots.

The multiple steps in semiconductor manufacturing all serve to build components with the necessary electrical structure to rapidly switch and transfer signals for computational purposes. In addition to the switching transistors and the metal traces that conduct electrical signals between various regions of the chips, insulating materials separate conducting areas of the device.

In order to alter the characteristics of the semiconductor, the following steps are undertaken in various sequences depending on the complexity and functionality of the device.

- Deposition is the process by which an insulating layer is grown on the silicon substrate
- Diffusion bakes impurities into areas of the wafer to alter its electrical characteristics
- Ion implantation is another process for infusing the silicon with various dopants to change its electrical characteristics

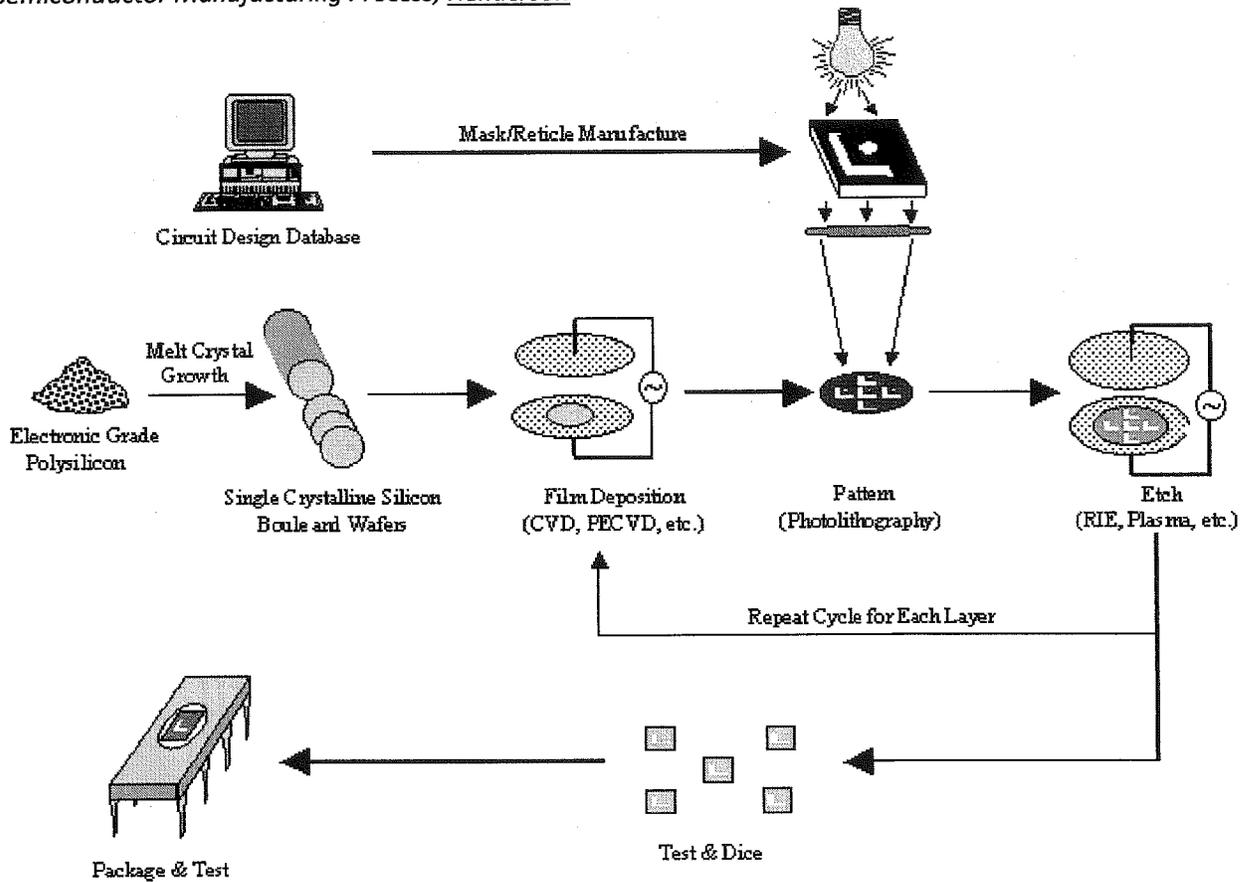
In between these steps, areas of the chip are patterned with an image for that particular layer of the device via photolithography. In photolithography, a very precise "mask" is used to expose photoresist that has been applied across the wafer, much like emulsion on film. This pattern hardens into an exact representation of the mask when it is developed.

Etching then removes selective areas of the pattern using a plasma that reacts to the material not covered by the hardened photoresist.

These steps are repeated to create layers of transistors with precise operating characteristics that have been determined by the deposition, diffusion and ion implantation steps. A specialized deposition process called Metallization forms the critical interconnections between different areas of the chip and different transistors. Metallization is also used to form the bonding pads that connect the chip to the package and then to the circuit board of the system it supports.

After all production steps are complete, a final protective layer is put over the entire wafer. Probe testing then provides an initial look at how many functional devices are on the wafer. Next, a very precise saw cuts the individual chips from the wafer and the good die are packaged, tested again and shipped to the customer.

*Semiconductor Manufacturing Process, Henderson*



In MFAB it this process takes:

- 9 weeks to build a wafer
- 250+ process steps
- 300+ machines
- 300+ robots

This capital intensive and highly advanced manufacturing process itself rests on a global value chain which can be strengthened by predictable and fair rules of trade. The machines or tools on which the process steps take place might be sourced in the US or Europe or Japan. The layout and operation of these tools is a valuable trade secret. Japan is also the foremost supplier of materials including wafer fabrication and packaging materials. The design of circuits and the equipment "recipes" defining how processing will be done in each of the hundreds of steps required to manufacture finished wafers are valuable intellectual property.

From the semiconductor designs, to the tools running in our factories, to materials used in making our devices and finally to distributing and selling them to our customers we depend on open markets and predictable rules of trade.

*HW*

MFAB exports about 2 billion chips per year. Where are those chips going? The majority of wafers are exported to an assembly test site in Malaysia for final processing – testing and packaging. From there they may go directly to a customer or to a product distribution center. More than 80 % of our sales are outside of the US.

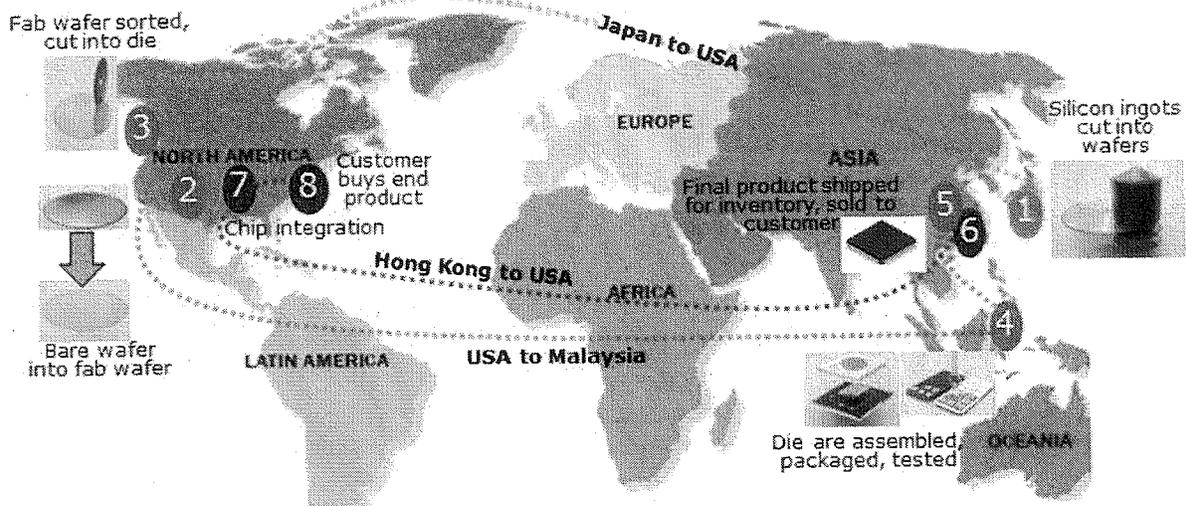
## **TPP**

The Trans-Pacific Partnership (TPP) offers an unprecedented opportunity to create a new, high standard for trade and economic engagement in an important region. This historic agreement lowers trade barriers among Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States and Vietnam. A recent study found that TPP will increase annual real incomes in the United States by \$131B (0.5% of GDP), and boost U.S. exports by \$357B, or 9.1% by 2030. Conversely, a delay in the launch of the TPP by just one year would represent a \$94 billion permanent loss, or opportunity cost, to the U.S. economy and create other risks. U.S. trade with TPP countries supported 15.6 million American jobs in 2014.

### **Why does TPP Matter?**

The importance of the huge and growing markets of the Asia-Pacific to U.S. semiconductor companies cannot be overstated. U.S. exports of semiconductors to TPP countries accounted for 41% of total U.S. semiconductor exports to the world in 2014 (\$17 billion). U.S. semiconductor exports to the broader Asia-Pacific region represent 85 percent of total U.S. semiconductor goods exports to the world (\$36.5 billion in 2014).

The semiconductor industry is one of the most global industries in the world. The semiconductor supply chain and ecosystem- from raw materials, to research and design, to manufacturing, to assembly, packaging and testing, and finally to distribution- are spread across the globe. While U.S. companies manufacture the majority of semiconductors in the United States, they rely on the global supply chain for raw materials, manufacturing equipment, and assembly/testing and packaging. TPP countries are a very important part of this global supply chain, with Japan, Malaysia, Singapore, and Vietnam specializing in the diverse segments that make up the semiconductor ecosystem.



Silicon to End-Product Purchase: 4+ Countries, 4+ States, 3+ trips around the world, 25,000 miles traveled, 100 days TPT, 12 days in transit

TPP provisions such as tariff elimination on semiconductor-rich applications (i.e. autos and auto parts), simplification and harmonization of customs and trade procedures, regulatory coherence, removal of impediments to e-commerce, and requirements to eliminate tariffs on tech products strengthen the semiconductor supply chain and better enable companies to achieve efficiency, lower costs, and reduce risks.

Trade secrets are a critical and major asset of U.S. semiconductor companies, and are essential to their technological progress and competitiveness. Semiconductor companies typically spend 15-20 percent of revenue on research and development (R&D), making intellectual property protection and enforcement of utmost importance to our industry. In 2014, U.S. semiconductor companies invested \$35 billion in R&D, totaling 18% percent of their total sales, one of the highest rates of any industry.

**Other specific provisions of interest to TI are:**

**Eliminating tariffs on Information technology**

The TPP region is both a major consumer and provider of information technology products and services. While most TPP parties were already members of the Information Technology Agreement (ITA), which eliminates duties on technology products, three additional countries (Brunei, Chile, Mexico) agreed to join, eliminating duties on semiconductors and other technology products.

**Forced technology transfer**

The agreement specifically prohibits forced technology transfer as a condition of market access or investment, including disclosure of source code or other sensitive intellectual property to a government entity.

#### Cross-border data flow and data localization

TPP ensures the free flow of data between countries, essential in today's global, interconnected economy. The agreement prevents mandates that data be stored within a country, known as data localization, a trend that is on the rise in many countries. For companies, like TI, with customers around the world, such data localization requirements would dramatically increase costs and complexity in operations, and would eventually require servers be owned or leased within each country where TI has customers.

#### Conclusion

The TPP is important agreement as it will set precedents for the future of the global trading system. If successfully ratified, the TPP will preserve and strengthen the global model of free and open markets, to the immense benefit of U.S. companies and its global partners. If the TPP fails, U.S. leadership in global trade will be severely weakened, as will the ability of companies to compete in international markets on a level playing field.

The TPP would promote open and fair trade, reaffirm America's global technology and trade leadership, strengthen our global supply chain and ensure that more products made in America – including semiconductors from Maine – can be shipped to customers around the world.

## Summary of P&G TPP Submission for the Maine Citizen Trade Policy Commission

P&G is a global leader in fast-moving consumer goods, focused on providing branded consumer packaged goods of superior quality and value to our consumers around the world. With \$76.3 billion in global sales, P&G sells products in more than 180 countries and territories, with manufacturing sites spread throughout the U.S. and international markets. We own and operate 26 manufacturing sites located in 20 U.S. states and territories, as well as some 100 manufacturing sites in foreign countries. Nearly 5 billion consumers use our products.

Commerce and trade is part of P&G's corporate DNA, and we actively support implementation of high-quality multilateral, regional and bilateral trade agreements as policy tools to accelerate economic growth, reduce tariff and non-tariff barriers to trade, and to promote regulatory coherence across geographical borders. While more than 60% of P&G's sales come from the Company's international operations, our growth outside the U.S., where 95% of the world's consumers live, doesn't come at the expense of U.S. workers. In fact, one in five of P&G's U.S. based jobs – and two in five in the state of Ohio – support our international business. These high paying U.S. jobs are in areas such as marketing, innovation and supply chain management.

Existing free trade agreements have helped to increase wealth and eliminate or reduce trade barriers globally. P&G benefits from these agreements because they have allowed us to create efficient, reliable supply chains that have expanded our access to markets around the world. The TPP region includes some of P&G's largest and fastest-growing markets in Asia Pacific and Latin America and we anticipate major benefits from TPP member countries' agreement to establish or enhance new protections for investors and reduce non-tariff barriers. The TPP Agreement will serve as the first U.S. trade agreement with five of the member countries, including Japan, the world's third largest economy, as well as Vietnam and Malaysia, two of P&G's fast-growing emerging markets.

TPP goes even further than previous trade agreements by addressing 21<sup>st</sup> century trade issues through chapters within the agreement on electronic commerce, customs administration, and small- and medium-sized businesses. These chapters complement our company's future business growth in all of the TPP member countries as online and non-traditional distribution models and sales channels rapidly expand. Today's consumers, especially those in the Asia Pacific Region, increasingly shop online and purchase our products via computers, phones, and other mobile devices. By ensuring the freedom of cross-border data flows, generally prohibiting data localization and protecting personal information, TPP will help boost electronic commerce among the 12 participating countries.

P&G expects some of our most important long term gains to stem from increased regulatory coherence. The TPP agreement's Cosmetics Annex commits partner countries to important underlying principles of "Good Regulatory Practices." The reduction in regulatory barriers will reduce costs and simplify business processes as duplicative and ineffective regulations are eliminated between member countries and increase the speed in which we can deliver the safest, newest and most innovative beauty and personal care products to consumers.

The TPP Agreement represents an important opportunity for P&G, our employees, shareholders, and for the communities where we live and work. P&G supports immediate passage of the TPP Agreement because it will not only benefit our current and future operations in member

17A

