



## 2016 Top Markets Report **Semiconductors and Semiconductor Manufacturing Equipment** Country Case Study

### European Union (EU)

The case study for Germany in the 2015 report is replaced this year with an EU case study, as it makes sense to look at multiple countries when selling into Europe. The EU is the second largest market for U.S. semiconductor exports, and the EU is expected to be the fastest growing market for semiconductor manufacturing equipment in 2016. Due to the EU's participation in the WTO Information Technology Agreement (WTO ITA), most types of semiconductors and Semiconductors Manufacturing Equipment enter EU member states duty-free, and further coverage came with the WTO ITA Agreement expansion that was agreed upon in December 2015.

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#### Overview of the Markets

##### Semiconductors

According to World Semiconductor Trade Statistics (WSTS), the Europe/Middle East (ME) market for semiconductors was \$34.3 billion in 2015, comprising 10.2 percent of the total worldwide market. ITA estimates based on semiconductor imports, production of electronic equipment containing semiconductors, and regional semiconductor market data placed the EU market at just under \$30 billion, around 8.5 percent of the world market. Switzerland, Ukraine, Russia and Turkey are the only notable markets outside of the EU in this regional category, and no non-EU Member State market in the regional category is among ITA's top 20 U.S. export markets for semiconductors.

EU Member State markets among the top 20 markets for U.S. exports are Germany, France, the Netherlands, the Czech Republic and Hungary. As stated above, Europe/ME is expected to be the fastest growing

market for semiconductors in 2016. See Appendix 2 for the full country market rankings for the semiconductor and semiconductor manufacturing equipment sectors.

The EU imported \$28.2 billion worth of semiconductors from the world in 2015. By country (including internal EU trade), Germany is the largest importer (\$18.1 billion), followed by the Netherlands (\$7.8 billion), France (\$6.2 billion), the United Kingdom (\$4.6 billion), Hungary (\$2.6 billion) and the Czech Republic (\$2.5 billion).<sup>1</sup> The rankings for imports differ from our top market rankings because imports may be re-exports to shipping hubs (such as the Netherlands) or imports from semiconductor final assembly/packaging and test facilities. Imports are, however, included in this analysis, as it is one of the few ways to measure individual country market size.

##### *Germany*

Germany is a manufacturing powerhouse when it comes to automobile electronics, industrial electronics

and medical electronics -- all important end markets for semiconductors. As Europe's largest electronics producing nation, Germany is a significant but mature market for U.S. semiconductors. Automotive electronics production (valued at \$19.5 billion in 2013)<sup>2</sup> is the largest sector of the German electronics industry with a 39.6 percent share; industrial electronics is the second largest sector, with 25.1 percent share of German production and also representing 50 percent of Europe's total industrial electronics market.<sup>3</sup> Germany's electronics production is expected to grow from \$34.9 billion in 2014 to \$36.9 billion in 2016,<sup>4</sup> an annual average growth rate of 3 percent.

#### *France*

France has the second largest electronics industry in Europe after Germany. The French electronics industry is dominated by the production of fixed and wireless communications (24 percent of total output in 2012), but France is also a leading producer of radar, navigation and defense electronics. It has eight of the top 50 leading indigenous electronics companies in Europe and nine of the top 50 European EMS (contract assembly of electronic equipment) providers.<sup>5</sup>

#### *The Netherlands*

The Netherlands also has a high ranking among the EU countries as an import market for semiconductors. As stated above, some of this is due to the Netherlands' importance as an import hub for Europe. The Netherlands also has significant medical electronics and navigation instrument industries.<sup>6</sup>

#### *Other EU Markets*

The Czech Republic and Hungary are also among the top 20 export markets for U.S. semiconductors. This is largely because a number of European electronic equipment manufacturers have moved production or assembly to lower cost locations in Eastern Europe during the last 5 to 10 years.<sup>7</sup> Therefore, although these countries are growing as importers of semiconductors, the semiconductor purchasing decisions are often made at the contracting companies in Western Europe or at the main office of the EMS company. We estimate that their share of the world market is only around 1 percent combined -- most of the export markets for U.S. semiconductors are in Asia.

#### Semiconductor Manufacturing Equipment

According to the SEMI industry association, the Europe/Middle East (ME) market for semiconductor capital equipment fell to \$1.94 billion in 2015 from \$2.38 billion in 2014, a 19 percent decrease. Due to the large volume of expected fab upgrades, however, the market is predicted to jump to \$3.37 billion in 2016, an over 70 percent increase.<sup>8</sup> ITA estimates that the EU market will reach \$2.8 billion in sales in 2016 (84 percent of Europe/ME -- the rest is primarily Switzerland and Israel), representing approximately 7.7 percent of the world market. The United States is the top source of semiconductor manufacturing equipment imports into the EU.<sup>9</sup>

The EU imported \$3.6 billion worth of semiconductor manufacturing equipment in 2015 (due to re-exports, the inclusion of parts and other issues, this exceeds market size), including nearly \$1.8 billion worth from the United States. By country (including internal EU trade), the Netherlands is the largest importer, importing nearly \$2 billion. This, however, is primarily parts and accessories for ASML, and our ranking considers announced purchase plans for fab equipment and projections of the size of markets for fully assembled semiconductor manufacturing equipment as factors; and the Netherlands ranks considerably lower by those measures.

Germany is next in imports at \$1.1 billion, but due to the Netherlands primarily being parts, in our calculation Germany has a higher ranking as a country. Ireland also out-ranked Germany in imports for 2015 at nearly \$1.4 billion, but due to the large swings in imports from one year to another (due to purchases of equipment by a single company -- Intel), Germany out-ranks Ireland on the average.

#### *Germany*

There are over 40 semiconductor fabs in Germany, run by a diverse set of companies, including Infineon, the Fraunhofer Institute research organization, NXP (Netherlands), and Osram/Siemens. Infineon finished its acquisition of U.S. company International Rectifier in 2015, and its ranking among worldwide semiconductor companies changed from 13th in 2014 to 12th in 2015.<sup>10</sup> U.S. companies, such as Globalfoundries and Texas Instruments, also have fabs in Germany.<sup>11</sup> Depending on the year, usually either the Netherlands

or Germany is the top EU importer of semiconductor manufacturing equipment.

Average annual U.S. exports (from 2009 to 2013) were \$587 million, and the United States is the top supplier of semiconductor manufacturing equipment into Germany with over 30 percent market share. Globalfoundries plans to make further investments in its Dresden fabs for its FD-SOI technology<sup>12</sup>, which would probably include state-of-the-art semiconductor manufacturing equipment purchases. Infineon is also expected to purchase semiconductor manufacturing equipment in 2016.<sup>13</sup>

#### *The Netherlands*

Imports of semiconductor manufacturing equipment into the Netherlands are primarily for parts and auxiliary accessories for major Dutch semiconductor manufacturing equipment producer ASML. Over 90 percent of the \$1,979 million imports of semiconductor manufacturing equipment into the Netherlands were parts and auxiliary equipment (\$1,808 million). There also are some semiconductor fabs in the Netherlands, most owned by NXP (formerly Philips Semiconductor). NXP bought out U.S. semiconductor company Freescale (formerly part of Motorola) in 2015, and according to IHS, NXP jumped from the 15<sup>th</sup> largest semiconductor company to seventh.<sup>14</sup>

The top exporters of semiconductor manufacturing equipment into the Netherlands were Germany (\$890 million) and the United States (\$680 million). Eighty-eight percent of Netherlands imports from the United States were parts, however, and for imports from Germany, nearly 98 percent were parts.<sup>15</sup> Depending on the year, the Netherlands sometimes surpasses Germany as a U.S. export market; however, on the average Germany is a larger market than the Netherlands.<sup>16</sup> Although some of the imports of parts are parts for repair or replacement, ASML equipment contains parts manufactured around the world.

#### *Ireland*

Ireland's semiconductor manufacturing equipment market ranking is primarily due to Intel's fabs in that country. For instance, Ireland surpassed Germany as a U.S. semiconductor manufacturing equipment export market in 2014, but this was due to Intel's upgrade of its semiconductor fabs (semiconductor fabrication/manufacturing facilities) in Ireland.<sup>17</sup> Intel

announced major investments in its Irish fabs in 2014 of 3.5 billion Euros,<sup>18</sup> and equipment purchases are now showing up in the statistics. This is expected to continue in 2016. Irish imports of semiconductor manufacturing equipment reached \$1.3 billion in 2015. Japan is the top supplier with \$728 million, and the United States is in second with \$350 million.

#### *France*

French/Italian company STMicroelectronics, SOITEC, LETI (research institute) and others have fabs in France.<sup>19</sup> STMicroelectronics is the top EU semiconductor company, with fabs in France, Italy and Singapore.<sup>20</sup> French imports of semiconductor manufacturing equipment from the world were worth \$124 million in 2015, of which \$66 million came from the United States (ranked first) and \$57 million from Germany. STMicroelectronics is expected to purchase additional equipment in 2016.<sup>21</sup>

#### *Belgium*

Although representing less than 1 percent of world imports and U.S. exports in 2015, Belgium will be notable as a market for U. S. semiconductor manufacturing equipment for 2016 because of a major fab equipping by Belgium research consortium IMEC.<sup>22</sup>

### **Challenges and Barriers to U.S. Semiconductor and Related Equipment Exports**

Although the European Union continues to be an important manufacturer of semiconductors and semiconductor equipment, its global market share has not seen substantial growth due to competition from Asian and U.S. firms.

Overall, U.S. companies enjoy access to the EU semiconductor and semiconductor manufacturing equipment markets, which present no significant tariff or non-tariff barriers to U.S. exports. Semiconductor companies new to the market, however, need to be aware of EU regulations that indirectly affect them. Semiconductor manufacturing equipment is subject to some regulations. Most U.S. exports of semiconductors and semiconductor manufacturing equipment enter the country duty-free because EU member states participate in both the WTO Information Technology Agreement (WTO ITA) and the newly-signed WTO ITA expansion.

## Semiconductors

Semiconductor production in the EU comes both from large indigenous companies in a handful of member states and, to a lesser extent, from European facilities owned by non-European (primarily U.S.) firms. EU firms held 9 percent of the global market share for semiconductor supply in 2015. During the same period, U.S. firms held 56.6 percent of the Europe/ME market, slightly over the 50 percent U.S. companies have of the world market.<sup>23</sup> European semiconductor companies primarily compete in automotive ICs and sensors.

### Semiconductor Manufacturing Equipment

Netherlands company ASML is the leader in lithography equipment – the only major segment of semiconductor manufacturing equipment where the United States does not have a top producer. ASMI, another Dutch company, is also a major player in semiconductor manufacturing equipment. Although some German companies produce semiconductor manufacturing and test equipment, German companies represent less than 5 percent share of worldwide integrated circuit manufacturing equipment sales.<sup>24</sup> U.S. companies face competition in the EU, primarily from Dutch, German and Japanese firms, which also have good sales networks in Europe.<sup>25</sup>

## **Opportunities for U.S. Companies**

### WTO Information Technology Agreement Expansion

Implementation of the expansion will begin in July 2016. The EU will offer immediate duty-free access for almost all of the 34 semiconductor and semiconductor manufacturing related products in the WTO ITA expansion. Semiconductor-related products that are not granted immediate zero are photoblanks, objective lenses, optical filters and other optical elements. These products will be duty free on January 1, 2019, after three tariff cuts on July 1, 2016; January 2017 and January 2018.<sup>26</sup> See Appendix 1 for a list of the semiconductor-related products in the WTO ITA expansion, information on the WTO ITA expansion and links to key documents.

### Semiconductors

WSTS predicts a slight drop in sales in Europe/ME market in 2016 of -1.6 percent to \$33.7 billion and a slight recovery of 2.5 percent in 2017 to \$34.5 billion.<sup>27</sup> As the EU makes up most of the Europe/ME market, we expect the EU to follow the Europe/ME trend.

### Semiconductor Manufacturing Equipment

After the cyclical downturn last year, SEMI predicts that Europe/ME will be the fastest growing market from 2015 to 2016, increasing 63 percent year to year to \$3.17 billion, making it the largest growth region for 2016.

### **2016 Trade Shows/Events in the EU**

Oct. 25-27: SEMICON Europa 2016, Grenoble, France

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- <sup>1</sup> Global Trade Atlas, Accessed 4/4/ 2016.
- <sup>2</sup> Bosch, Conti Dominate Automotive Electronics Market” [EETimes Europe](#), Jun3, 2014. Data from Semicast
- <sup>3</sup> Germany Trade and Invest
- <sup>4</sup> “The Yearbook of World Electronics Data, Volume 1: West Europe 2014”, Reed Electronics Research
- <sup>5</sup> “The Yearbook of World Electronics Data, Volume 1: West Europe 2014”, Reed Electronics Research
- <sup>6</sup> “The Yearbook of World Electronics Data, Volume 1: West Europe 2014”, Reed Electronics Research
- <sup>7</sup> “The Yearbook of World Electronics Data, Volume 1: West Europe 2014”, Reed Electronics Research
- <sup>8</sup> “SEMI’s 2015 Year End Semiconductor Equipment Forecast Report”, SEMI,
- <sup>9</sup> United Nations COMTRADE Database; TPIS Database: UNHS IMPORTS
- <sup>10</sup> “Global Semiconductor Market Slumps in 2015, IHS Says” [IHS Press Release 4/4/2016](#). Company ranking does not include fables.
- <sup>11</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>12</sup> “Globalfoundries Launches Industry’s First 22nm FD-SOI Technology Platform” [Globalfoundries Press Release 7/13/2015](#).
- <sup>13</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>14</sup> “Global Semiconductor Market Slumps in 2015, IHS Says” [IHS Press Release 4/4/2016](#). Company ranking does not include fables.
- <sup>15</sup> Global Trade Atlas, accessed 4/1/2016.
- <sup>16</sup> United Nations COMTRADE Database; TPIS Database: UNHS IMPORTS. Average imports and exports are used for ranking calculation for semiconductor manufacturing equipment because semiconductor fab equipping and equipment upgrades can skew the data from one year to another.
- <sup>17</sup> [World Fab Forecast](#), SEMI 11/2015.
- <sup>18</sup> “Euro 3.5 Bn: Intel Makes Biggest Private Investment in History of State” [Thejournal.ie](#) 3/27/2014.
- <sup>19</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>20</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>21</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>22</sup> [World Fab Watch](#), SEMI, 3/4/2016
- <sup>23</sup> “SIA 2016 Factbook” [Semiconductor Industry Association \(SIA\)](#) March 2016.
- <sup>24</sup> “IC Manufacturing Equipment Yearly Sales, 2009-2013” [VLSI Research](#) 11/2014.
- <sup>25</sup> Germany Trade and Invest
- <sup>26</sup> [WTO members conclude landmark \\$1.3 trillion IT trade deal](#) – Includes link to the parties’ national line schedules. [WTO](#), 12/16/2015. Also see Appendix 1.
- <sup>27</sup> “WSTS Forecasts the Semiconductor Market to Maintain Steady Growth Until 2017”, [WSTS Press Release](#)