WORLD SEMICONDUCTOR TRADE STATISTICS
An introduction to WSTS
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In sync with the dynamic semiconductor market

Technological innovation drives the semiconductor industry. In only a few short decades, integrated circuits (IC) have transformed from exotic elements found only in top-of-the-line electrical devices into the basic components of all modern electronics.

The semiconductor manufacturing industry shows no signs of slowing down, but the very same innovation that drives it creates an extremely dynamic and volatile market. Pricing is increasingly competitive. Rising research and development costs, tight design-in windows, and ever-shortening product life cycles mean that manufacturers need to remain on their toes – focusing not only on current market conditions but also anticipating future developments.

This is where World Semiconductor Trade Statistics (WSTS) can help. WSTS provides the best source of industry-wide market statistics, which allows your company to adjust to today’s dynamic business conditions, quickly and effectively.

We offer:

- The only source of monthly unit sales and revenue figures collected directly from semiconductor manufacturers
- A complete market overview that shows worldwide and regional sales on segment and product-specific levels
- Up-to-date product classifications that keep pace with developing technologies
- Additional value-added reports allowing you to identify market trends, review historical data and see exactly how semiconductor components are being incorporated into end-use products.
A history of reliable service

For more than 25 years, WSTS has operated as the world’s leader in global semiconductor market statistics. Fifty-five companies throughout the world – representing companies both large and small – are members. They allow us to provide the most complete and up-to-date picture of the semiconductor industry available.

Members enjoy access to monthly market statistics on a reciprocal basis – those companies that supply sales and revenue data are able to view detailed market data across product categories, market segments and regions. Secure data-collection channels and disclosure policies ensure that individual company information remains private.

Because WSTS information is created by semiconductor companies for semiconductor companies, our market statistics are designed to be easily incorporated into the analyses and metrics your market-research team already uses.

● Eight of the world’s top-10 largest semiconductor companies are WSTS members – and 18 of the top-25 largest – giving an excellent representation of both the global and regional markets*

● Sensitive information is kept safe. Strict guidelines govern the collection and presentation of data, ensuring that company information is protected and market position is not revealed

● Product category classification is determined by company members, ensuring that the information is relevant and easy to incorporate

* Company size data from IHS iSuppli’s supplied rankings for 2011
Anticipate where the market is headed

In addition to WSTS monthly markets statistics, our members also receive WSTS’ biannual forecasts, one of the most respected in the industry. As with our market statistics, these forecasts are created directly by industry members and are the only one of their kind to monitor exactly how manufacturers themselves anticipate the short and midterm business climate.

During the meetings where WSTS forecasts are formulated, our members hear first-hand from other industry participants how they see the future market conditions for the industry. Members can interact with industry experts – those who really understand the data and handle market research for their companies.

WSTS follows strict guidelines at its meetings to ensure members adhere to competitive best practices and comply with antitrust laws. Such guidelines make WSTS meetings a safe environment for networking and exchanging information.

- WSTS forecasts are the most accurate and most respected in the industry
- At WSTS meetings, members can interact with industry peers and gain valuable insight into the industry
- WSTS’ biannual forecasts looks at the future of the market over both the short and mid-term, keeping your company up to speed with a rapidly changing industry
- The WSTS forecast tool – unique to the industry – allows member companies to quickly evaluate their own market estimates and compare them to past forecasts. The tool increases the speed and accuracy of individual forecast creation and the generation of the WSTS consensus forecast.
It’s affordable and easy to join

WSTS membership costs a fraction of the price of market research or hiring internal or external analysts.

It gives you exclusive access to the only source of market figures collected directly from semiconductor companies.

All companies that directly design and market either discrete or integrated semiconductor products can become WSTS members. Membership is available to both fabbed and fabless manufacturers.

Membership fees are flexible and determined on a sliding scale based on company size.

While membership in a regional semiconductor association is not a prerequisite for joining, certain regional associations offer special membership packages.

To join, please fill out our online membership form or contact WSTS Administrator Bernd Schniggenfittig for more information:

Bernd Schniggenfittig
E-Mail: bs@wsts.org
Telephone: +49 (8062) 807 1261
Fax: +49 (8062) 807 1262

Postal address:
Fasanenstrasse 12a
83052 Bruckmuehl
Germany

This presentation gives further information about the unique service WSTS provides and how it can help your company succeed in the current market and prepare for the future of the dynamic semiconductor industry.
Benefit from the industry’s best source of market statistics

In today’s dynamic global semiconductor industry, companies increasingly require reliable sources of timely, accurate information to stay abreast of market developments and prepare for the future. Pricing and production levels can have dramatic effects on market participants, and there are few other industries in which conditions can change so rapidly. WSTS market statistics are the sole source of industry-wide unit sales and revenues data gathered directly from industry members, giving you the most accurate and timely view of the market available and allowing your company to react quickly and plan appropriately.

- WSTS is the most comprehensive, relevant, and effective source of monthly semiconductor unit sales and revenue data and the only source of this data collected directly from industry participants – delivered directly without influence from industry analysts, research firms, or other third parties
- Our market data is current; it is published within four weeks of the closing of the month, giving your company the most up-to-date information on the industry available
- A total of 55 WSTS members represent key players in the industry. WSTS market statistics represent all key world market segments in all important product areas
- WSTS provides detailed market information on many product segments that are not available anywhere else with such frequency

“WSTS is committed to remaining the most respected source of market data and forecasts for the semiconductor industry. WSTS market data is unrivaled in regards to its frequency, accuracy, detail, and market coverage. Our forecasts are the only ones that leverage the collective experience of the industry’s major players with the market intelligence of a large portion of the semiconductor industry.”

Bernd Schniggenfittig
WSTS Administrator
WSTS information is comprehensive

Market information is of little use if it does not offer the clarity and breadth to view those areas most important to your company. With a wide range of participants in all major markets, WSTS market statistics not only offer the best overall picture of the market, they also allow your company to examine those areas most important to its business – whether it is a niche market with fewer players, a home market where your company wants to gauge its market share, or a perhaps new, burgeoning segment your company considers entering.

- We offer the most complete, current, and broadest picture of the semiconductor market, along with coverage of hundreds of product segments and a breakdown by regional markets.

- The WSTS monthly Blue Book details worldwide semiconductor shipments in 205 product categories by revenue and units sold and an additional 36 product categories by units. The Blue Book comprises all major semiconductor markets and many niche areas, which otherwise offer little visibility to sales, production, and pricing data.

- Detailed global semiconductor industry market statistics are presented by product type, region, unit volume, average selling price (ASP), application segment, and memory bit size.

- In addition to the monthly Blue Book, WSTS members also have access to a wealth of information:
  - Biannual four-year industry forecasts, covering the current and following year on a quarterly basis
  - Historical industry-wide sales data, updated monthly and including data extending back to 1991
  - The WSTS Green Book, a monthly graphical representation of trends in the industry
  - Quarterly breakdowns of regional markets by country, detailed country-specific market information
  - An annual End-Use report providing key information on end products into which IC components are being incorporated
  - Regular WSTS meetings where members can listen first-hand to the views of major industry participants, new entrants, and niche specialists

“\textit{In order to predict where the market is going, to be several months ahead, and to know whether to adopt an aggressive or conservative approach, it is necessary to have access to raw unit sales and revenue data. WSTS provides some of the most trusted market data for the semiconductor industry.}”

Michael Wang
Associate V.P.
Emerging System Lab. • Microelectronics and Memory Solution Group
Macronix International Co.

Established in 1989, Macronix is a leading integrated device manufacturer in the Non-Volatile Memory (NVM) market, providing a full range of NOR Flash, NAND Flash, and ROM products. Macronix delivers high-quality, innovative and performance-driven products to customers in the consumer, communication, computing, automotive, and networking markets.
WSTS information is relevant

WSTS provides much more than simple, raw market data. Product segments and specific product categories have been created through consensus of market-research experts at WSTS' member companies. Product categories are chosen to give the best visibility into key markets and to best align with the market-classification terms used by WSTS members. Categories are regularly updated and modified to stay up-to-speed with the fast-paced semiconductor landscape. WSTS forecasts are among the most respected in the industry and the only forecasts showing how semiconductor manufacturers themselves anticipate short and mid-term market conditions.

“WSTS market statistics are the best value for the money among the multiple sources of market data we use. They give an important overall picture of the market and their product classifications align nicely with the product classifications already in place at our company.”

- WSTS updates categories and regularly includes new product areas to keep up with the ever-changing, dynamic semiconductor market
- Member companies determine those products and areas that are included in reports and forecasts, giving them access to the information they need most
- For more detailed analysis, members can trace the evolution and development of specific products’ market share and their growth rates – monitoring current trends or looking through historical data
- Member companies may request custom surveys that address specific products or present particular market segments in greater detail (additional fees apply)
- Eight of the world’s top-10 largest semiconductor companies are members – and 18 of the top-25 largest – giving an excellent representation of both the global and regional markets
- Members not only have access to unit-sales numbers but to specific application fields. They can see which sectors and products are most in demand.

Started as a geophysical exploration company in 1930, Texas Instruments has grown to one of the world’s largest semiconductor companies and was the first to introduce commercially-available silicon transistors in 1954. Today, the company has manufacturing, design, or sales operations in more than 35 countries and employs roughly 35,000 people worldwide

“One of the most important features of WSTS data is that it is collected monthly, directly from industry members. You can trace the dynamism of the semiconductor market on a month-by-month basis.”

- Hirotaka Kusama
  Manager
  Marketing Research & Analysis Department
  Renesas Electronics Corporation

Formed in 2010 through the merger of NEC Electronics and Renesas Technology, Renesas is the world’s largest manufacturer of microcontrollers and one of the largest manufacturers of semiconductor systems for mobile phones and automotive applications. The company is based in Tokyo, Japan.
WSTS information is effective

WSTS reports and forecasts provide essential insight into the current semiconductor market, and our member companies use this information in many ways. They rely on our market statistics to help align internal and external forecasts, to help quantify the effectiveness of business strategies, to determine current and future production levels, to set internal targets, to create employee-incentive programs, and to examine the feasibility of launching new products and entering new product segments. WSTS provides valuable market information that helps market-research teams sharpen their own analyses and offers an important reference point for aligning key benchmarks.

● The broad-based view and accurate product-area breakdowns make our data invaluable across a wide range of uses
● WSTS up-to-date market statistics give key reference points that help verify the accuracy of internal or external market analyses
● Helpful graphical representations in the WSTS Green Book allow research teams to easily identify market trends
● Timely reporting and readily-accessible formats mean that members can quickly incorporate WSTS data in their own internal reports and adapt their business strategies accordingly
● WSTS is the best source for up-to-date market information, and its data is often used by competing reports and forecasts. WSTS members receive this data directly, without influence from analysts, and benefit from the most effective overview of the semiconductor market.

“As the only source of monthly unit sales and revenue data coming directly from companies, WSTS provides us with a very good broad picture of the semiconductor market. We use WSTS data to help determine overall market size, verify the size of specific markets, identify potential growth areas, and as a concurrent indicator to determine the health of the industry…as a company, you already know how well your business is doing. WSTS data helps you look at potential new markets that you aren’t already active in.”

The Logic Vendor
Corporate Strategy Department

The Logic Vendor is the world’s leading provider of all programmable FPGAs, SoCs and 3D ICs. These industry-leading devices are coupled with a next-generation design environment and IP to serve a broad range of customer needs, from programmable logic to programmable systems integration.
Put WSTS information to work for you

WSTS membership is extremely affordable, and its reports are easy to put to use. Compared with external and internal market analyses, industry reports, and primary research, WSTS statistics are by far the least expensive avenue for important market information. Reports available through a secure member portal in easy-to-use formats (HTML, XLS, JPEG, and PDF) are simple to access and can be easily incorporated into your company’s own methods for reporting, analyses, and metrics.

“WSTS provides important market information that is valuable for many types of analysis. We use the information in part to look at market development, determine market share, and create budgeting reports. It is an excellent value for the money, and comparable information from other sources is much more expensive.”

Ali Sener
Manager Market Research
Marketing and Competitive Intelligence
Vishay Semiconductor

Vishay began operations in 1962 with patented technology that had two product lines: foil resistors and foil-resistance strain gages. The company has since grown into a broad-line manufacturer of electronics components and spun off of its foil technology products in 2010. Vishay manufactures a diverse portfolio of semiconductors and passive components.

Product segments and categories make identifying key information easy. Quarterly regional breakdowns by country allow you to more accurately pinpoint markets. The annual End-Use report details exactly which semiconductor products are being incorporated into which specific end products. In addition, member companies can also request customized market surveys that examine specific products or market segments in even finer detail (additional fees and conditions apply).

- WSTS market statistics are one of the least expensive forms of market information available and the only source of data collected directly from the industry

- WSTS membership includes access to a wealth of value-added products, such as historical unit sales and revenue information, the WSTS Green Book – making identification of market trends easy – and WSTS biannual forecasts

- The annual WSTS End-Use report shows exactly which semiconductor products are being incorporated into which specific end products

- For even greater clarity on specific key product and market areas, members can request customized market surveys (additional fees and conditions apply)

- Easy-to-use formats mean that incorporating WSTS reports into your company’s own reporting, analyses, and metrics methods is simple
How to join WSTS

All companies that directly design and market either discrete or integrated semiconductor products can become WSTS members, and membership is available to both fabbed and fabless manufacturers. Companies can join WSTS as either a regular or an associate member. Annual membership fees are calculated on a sliding scale determined by annual gross revenues and the type of membership chosen:

Regular members have full access to all WSTS information and full participation in determining policy matters, such as data format and product definitions and changes.

Associate members have access to nearly all WSTS information, with some limitations based on reciprocity, but do not have voting rights. Associate member status is limited to a duration of two years and is restricted to companies with annual revenues below $1 billion and a product portfolio that extends over no more than six WSTS product categories.

An online registration form and additional information about membership benefits are available on the WSTS homepage (www.WSTS.org).

Special membership packages are available for members of several regional semiconductor associations (such as the SIA, ESIA, TSIA, KSIA, and the WSTS Japan Council). Please contact your regional association for more details.

Additional information about how we collect and distribute our market statistics, the history and structure of the association, and a list of our members can be found on the following pages.
How we collect Blue Book market statistics

WSTS has developed a streamlined and secure method of collecting, compiling, verifying, and distributing its monthly unit sales and revenue statistics. A group of select WSTS partners – chosen for their outstanding work and the strong reputations they have in their respective fields – aid in the collection and verification of data and its presentation and release to our members.

Individual member companies enter unit sales and revenue data into a simple online form on a monthly (in some cases quarterly) basis.

Data-collection agents – split into three regions – compile information from the companies. They check the data for completeness, consistency, and plausibility and resolve any apparent anomalies with the member companies.

Our data-preparation partner enters Blue Book data into the WSTS history and trend reports (Blue Book History and Green Book) and creates the corresponding graphs and charts.

Our worldwide data-collection agent receives the regional data, further checks the information for consistency, aggregates totals, and prepares the Blue Book statistical report.

Individual member companies can access WSTS’ complete monthly unit sales and revenues statistics, along with historical and trend reports, less than a month after submitting their company data. A secure, password-protected WSTS Internet portal ensures safe access.
Sensitive company information is kept safe

Trusted data collection

Because WSTS uses unit sales and revenue information collected directly from its member companies to generate its market statistics, ensuring privacy is a top priority. With more than 25 years of experience as the most respected source of semiconductor market data, WSTS has developed dependable methods for fast data aggregation, while making sure that sensitive information is kept safe. Company figures are collected and compiled by regional data-collecting agents (DCAs), who follow strict guidelines to assure the accuracy of the information and to safeguard its privacy.

(Additional information about WSTS’ DCAs can be found in the partner section at the end of this presentation)

Dependable market-statistics reporting

In addition to strict guidelines to protect the privacy of individual company figures, WSTS has important policies about how market statistics are presented. Information from at least three companies must be used when reporting market statistics in a particular segment. In most segments, many market participants are involved, and this type of transparency is not an issue. This prevents disclosure of confidential information to competitors or third parties. In those few examples where market position might be revealed, WSTS uses specific product grouping so that data from any one company cannot be extrapolated and remains private.

“WSTS is a very trusted organization with a long history. It is very important that we are able to look at the total market result without any companies’ actual results being revealed. The data we submit on a monthly basis is kept safe and confidential.”

Tatsuya Makiuchi
Market Research Group Manager
Strategic Planning Department
Toshiba Corp.
WSTS meetings, an invaluable window into the industry

WSTS’ regular meetings present an important venue for members to help shape forecasts and future reports, and to interact with their industry peers. WSTS chooses locations that are easily accessible by the majority of its participants. The location for meetings with worldwide participation rotates between major cities in the Americas, Europe, Japan and Asia.

Members are able to exchange experiences with other market participants, gain important information about current market sentiment, and hear directly from their peers how they view the future direction of the market. In addition to helping direct WSTS activities and formulating and steering its policies and programs, member meetings also generate industry forecasts that examine the market for the next four years (the current and following year on a quarterly basis, and the subsequent two years on a yearly basis).

Prospective members may participate in WSTS meetings by invitation. To request an invitation, please contact:

**Bernd Schniggenfittig**
WSTS Chief Executive Officer and Administrator at bs@wsts.org or +49 (0) 8062 807 1261

or

**Barbara Smith**
WSTS Assistant to Administrator at bhs@wsts.org or +1 (408) 559 3592

“We use WSTS data to analyze our position in the market versus other competitors. Its monthly DRAM statistics are one of the benchmarks we use as a reference point. We look to forecast meetings to get insight on the market and listen to participants who might have strong opinions about where the market could be headed.”

**Osamu Nagashima**
Executive Professional Technical Marketing Group Elpida Memory, Inc.

Established in 1999, through the merger of the dynamic random-access memory (DRAM) businesses of Hitachi, Ltd. and NEC, Elpida is a DRAM specialist and the fifteenth largest semiconductor company by sales in 2011. Elpida grew to include the DRAM business from Mitsubishi in 2003. The company based in Tokyo, employs around 3200 people.
## Regularly scheduled WSTS meetings

### Board of Directors Meetings
Members of the Board of Directors meet at least twice a year to supervise the execution of WSTS activities. The meetings result in the passage of resolutions and appointments to certain WSTS positions. Minutes of the meetings are issued after all Board of Directors meetings.

### Executive Committee Meetings
Members of the Executive Committee – the World Chairman, the five Regional Chairs, and the WSTS Administrator – meet at least twice a year to direct and execute WSTS policies and programs. At these meetings, resolutions might be passed and members appointed to WSTS positions. Minutes of the meetings are issued after all Executive Committee meetings.

### Working Group Meetings
Certain WSTS members also gather in regional or sector-specific groups in order to prepare, launch, and support various programs and initiatives. These groups create materials such as manuals, guidelines, or other documentation over a range of topics for both specific or general use in the WSTS.

### Committee Meetings
Committee Meetings take place twice a year. Beside steering the WSTS program and activities, their primary focus is to review the current situation in the semiconductor market and to formulate forecasts for the upcoming quarters and following two years. Because members from throughout the world attend Committee Meetings, they are a good opportunity to interact with other members and gain insight from participants across the industry. Guest presenters may be selected to speak on items relevant to the industry. Members who attend have access to presentation notes and handouts. Following the meeting, the WSTS industry forecast is issued.

### Regional Chapter Meetings
Several WSTS members also meet two to four times a year to review market developments in their own regions, formulate regional policies, and initiate projects. Such meetings are among the venues for drafting proposals requesting Blue Book format changes – i.e., requesting changes to product classifications in WSTS market statistics or the inclusion of new product types.

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“Innovation rarely takes place in a vacuum. Everybody is looking for new technologies and new market possibilities. Often, these new technologies are spearheaded when you are communicating with the rest of the industry”

---

Michael Wang
Associate V.P.
Emerging System Lab.
Microelectronics and Memory Solution Group
Macronix International Co.
WSTS’ organizational structure

WSTS is divided into four regional chapters to better facilitate interaction between member companies in the same geographical area and to respond to the particular needs of WSTS members on a national and regional basis.

Atop the regional chapters, the WSTS Board of Directors, the Executive Chairman, and the WSTS Administrator and Assistant to Administrator are responsible for directing and executing global WSTS programs and policies.
The WSTS Blue Book

The WSTS Blue Book covers 205 product categories by revenue and units sold, along with an additional 36 product categories by units. WSTS utilizes a streamlined and secure method of collecting, compiling, and verifying its unit sales and revenue statistics, which are published on a monthly basis in the Blue Book.

The Blue Book outlines worldwide and regional shipments and sales for virtually all semiconductor products – ranging from discrete components to memory chips, analog and logic ICs, microcontrollers, microprocessors, optoelectronics, sensors, and actuators.

Blue Book data includes all monthly net billings (shipments) between semiconductor manufacturers and their end customers. In calculating sales revenues, billing is reported according to customer shipment location. To value internal shipments within a company – i.e., sales to a subsidiary or division – actual sales prices are used when they are applicable. When this pricing data is not available, comparable market prices are used.

To ensure accuracy, WSTS’ regional data collection agents look closely at how our member companies classify their products and examine the figures they submit on a monthly basis. Should DCAs detect any discrepancies, they immediately contact the member company for clarification.

Over the course of its 25-year history, WSTS has perfected its methods for market-statistics collection, guaranteeing the most precise information in the industry.
## Main product category
Breakdown by region; worldwide revenues, units, and ASP

<table>
<thead>
<tr>
<th>Month</th>
<th>Americas</th>
<th>Europe</th>
<th>Asia Pacific</th>
<th>WW Dollars</th>
<th>WW Units</th>
<th>WW ASP</th>
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## Subcategory classification by market segment
Showing worldwide and regional revenues, worldwide units sold, ASP, and revenues in US Dollars

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<tr>
<th>Market</th>
<th>Americas</th>
<th>Europe</th>
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</table>

## Subcategory classification by application-product category
Detailing worldwide revenues in US Dollars, units sold, and ASP

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<th>Application</th>
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**Month-by-month figures**
# Blue Book total semiconductor page

## Total semiconductor sales
Breakdown by regional and worldwide revenues and units

## Currency exchange rate
Based on the average monthly exchange rate

## Quarterly product segment breakdown
Showing total worldwide sales in product segments

### World Semiconductor Trade Statistics - 2011

**Billings - $000’s omitted, except for ASPs**

<table>
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<th>3rd QTR</th>
<th>4th QTR</th>
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**Currency Exchange Rates**

- **Japanese Exchange Rates**
  - **Month**
    - 82.53
  - **YTD**
    - 82.63
- **Euro Exchange Rates**
  - **Month**
    - 8.740
  - **YTD**
    - 8.740

- **Worldwide Sales (3 Month Totals)**
  - 000’s omitted

## Note

*Restatements are shaded gray to reflect corrections reported by participant(s).*

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Identify trends

The WSTS Green Book

The WSTS Green Book is a valuable tool for identifying key market trends on a market-wide, category, or segment-specific level. The Green Book, compiled by long-time industry expert Stuart Harris at Tier One, uses standard market-analysis tools to highlight developments across all of WSTS’ categories and segments, both regionally and globally.

The Green Book can help your market-analysis team track the direction of the market more effectively and efficiently. The 121-page report is presented in PDF format and its graphs and diagrams can be easily incorporated into analyses, reports, and presentations.
A closer look at the numbers

Product category or segment
Both specific product categories and larger product segments are analyzed.

Breakdown by region

Three-month moving average
An industry standard statistical tool that helps to smooth out wider variations in data and identify actual trends.

Billing growth rate
A key indicator of future market performance, shown as the percent change over the quarter versus the past year (above) and over the current 12 months versus the past 12 months (below).
Gauge where the market is heading

WSTS Forecasts

WSTS biannual forecasts are among the most respected and accurate in the industry. Similar to WSTS market statistics, the forecast is unique to the semiconductor market because it is created directly by the companies involved in semiconductor production and not by outside observers.

WSTS members meet twice a year at Committee Meetings to formulate an official forecast for the coming quarters and years. Market analysis experts from the member companies then have the opportunity to share their ideas about the future direction of the industry.

Beforehand, they submit confidential outlooks that are compiled into a pre-meeting average forecast. Together, they hone the pre-meeting average into a final forecast that has become a standard in the industry.

For 2011, the WSTS final annual forecast deviated no more than 5 percent from the actual sales figures over its one-and-a-half-year life cycle, and the final forecast in November 2011 was within 0.9 percent from the actual figures for the year.

The WSTS forecast helps our members refine their internal outlooks and estimate the future direction of the overall market and of specific products, product segments, and regions.

Forecast accuracy for the year 2011

Original forecast vs. final year-end result
WSTS forecasts

Product category, segment
WSTS’ detailed forecasts examine the broad market and all semiconductor segments and categories. Product categories are nearly identical to those used in the Blue Book, making it easy to track current and forecasted sales data.

Regional scope
Forecasts examine all major markets showing total revenues, quarter-on-quarter growth, and percent of the global market. They include sales in local currency to help offset exchange-rate fluctuations.

Short-term and mid-term forecasts
WSTS looks at expectations for the current and subsequent year on a quarterly basis and the following two years on an annual basis.

<table>
<thead>
<tr>
<th>MOS DRAM</th>
<th>2006 Total</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Total</th>
<th>2007 Total</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
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<th>Total</th>
<th>2008 Total</th>
<th>Q1</th>
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<th>2009 Total</th>
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<th>Q3</th>
<th>Q4</th>
<th>Total</th>
<th>2010 Total</th>
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<tr>
<td>Amer - $M</td>
<td>9,628.0</td>
<td>2,467.7</td>
<td>2,132.1</td>
<td>2,294.1</td>
<td>2,514.4</td>
<td>9,408.3</td>
<td>2,448.6</td>
<td>2,345.0</td>
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<tr>
<td>3/3 % $</td>
<td>21.8</td>
<td>-13.0</td>
<td>-13.6</td>
<td>7.6</td>
<td>9.6</td>
<td>-2.3</td>
<td>-2.6</td>
<td>-4.2</td>
<td>-3.1</td>
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<tr>
<td>% of World</td>
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<td>26.8</td>
<td>26.8</td>
<td>27.6</td>
<td>25.6</td>
<td>26.9</td>
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| Europe - $M | 5,063.9 | 1,444.4 | 1,169.9 | 1,211.2 | 846.7 | 1,280.0 | 1,273.2 | 1,251.7 | 1,230.2 | 1,208.8 | 4,963.9 | 4,988.7 | 5,105.5 |
| 3/3 % $ | 23.2 | -10.1 | -19.0 | 4.2 | 3.1 | -1.7 | -1.7 | -1.7 | -1.7 | -1.7 | -1.7 | -1.7 | 0.5 | 2.4 |
| % of World | 15.0 | 15.0 | 14.7 | 14.2 | 14.0 | 14.7 | 13.7 | 13.7 | 13.8 | 13.8 | 13.7 | 13.8 | 13.0 |
| Eur - Euro M | 4,018.4 | 1,101.9 | 892.5 | 930.0 | 987.7 | 1,127.7 | 1,131.3 | 1,054.9 | 938.6 | 922.2 | 3,787.0 | 3,805.9 | 3,897.2 |
| 3/3 % Euro | 21.9 | -11.7 | -19.0 | 4.2 | 6.2 | -2.5 | -1.7 | -1.7 | -1.7 | -1.7 | -1.7 | -1.7 | 0.5 | 2.4 |

| Japan - $M | 4,587.1 | 1,185.9 | 981.9 | 1,038.9 | 1,080.4 | 4,287.1 | 1,077.4 | 1,047.7 | 1,055.9 | 1,047.7 | 4,239.9 | 4,290.8 | 4,539.7 |
| 3/3 % $ | 38.7 | -4.7 | -17.2 | 5.8 | 4.0 | -6.5 | -5.8 | -6.5 | -5.8 | -6.5 | -5.8 | -6.5 | 1.2 | 5.8 |
| % of World | 13.6 | 12.3 | 12.3 | 12.1 | 11.8 | 12.1 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.8 | 11.6 |
| Jpn - ¥100M | 5,339.2 | 1,417.5 | 1,173.7 | 1,241.8 | 1,291.4 | 5,124.3 | 1,281.6 | 1,271.9 | 1,262.1 | 1,252.3 | 5,068.0 | 5,128.8 | 5,426.2 |
| 3/3 % ¥ | 46.5 | -3.3 | -17.2 | 5.8 | 4.0 | -4.0 | -3.8 | -4.0 | -3.8 | -4.0 | -3.8 | -4.0 | 1.2 | 5.8 |

| Asia Pac - $M | 14,507.7 | 4,549.7 | 3,976.2 | 4,014.4 | 4,263.3 | 16,503.5 | 4,309.0 | 4,354.7 | 4,400.4 | 4,446.1 | 17,510.2 | 18,350.7 | 19,598.5 |
| 3/3 % $ | 41.2 | -5.3 | -19.2 | 9.2 | 6.2 | 13.8 | 1.1 | 1.1 | 1.0 | 1.0 | 6.1 | 4.8 | 6.8 |
| % of World | 42.9 | 47.2 | 46.9 | 46.9 | 46.7 | 47.3 | 48.3 | 49.1 | 49.7 | 48.6 | 49.1 | 49.9 |

| World - $M | 33,768.6 | 9,647.6 | 7,960.1 | 8,566.4 | 9,152.7 | 35,326.8 | 9,103.0 | 9,015.5 | 8,959.2 | 8,941.1 | 36,018.8 | 37,344.4 | 39,252.3 |
| 3/3 % $ | 32.0 | -8.1 | -17.5 | 7.6 | 6.8 | 4.6 | -0.5 | -1.0 | -0.6 | -0.2 | 2.0 | 3.7 | 5.1 |
WSTS forecast tool

The WSTS forecast tool is the only one of its kind in the industry and was designed by Join(+) GmbH. The application greatly increases the speed, ease of use, and accuracy of entering and formulating WSTS forecasts. It allows member companies to see how their estimates would play out in real time and to compare them to previous WSTS forecasts.

- **Product categories**: Nearly identical to those in the Blue Book, the forecast tool’s product categories allow WSTS members to easily track forecasts for particular product types.

- **Convenient Data Entry**: Allows member companies making forecasts to quickly enter and adjust forecast information.

- **Graphical Representation**: Enables those making forecasts to see in real time how the forecasts match against past estimates, including all relevant WSTS forecasts for the time period.

- **Customizable view**: Allows adjustment of the currency and time period for the forecast.
WSTS market statistics support your regional semiconductor association

“WSTS serves as the principal source of data used in SIA’s advocacy efforts. It is an invaluable resource for presenting an accurate, up-to-date, and detailed picture of the industry to various audiences that SIA interacts with, including members of the US Congress, high-level officials in the executive branch of the US Government, member companies, international semiconductor forums such as the World Semiconductor Council, partner associations, the academic and research community, and other important semiconductor-industry stakeholders.”

Falan Yinug
Director, Industry Statistics and Economic Policy
Semiconductor Industry Association

WSTS membership directly benefits your company by providing the industry’s best monthly unit sales and revenue data, the graphical Green Book, the annual End-Use report, quarterly regional by-country breakdowns for major product lines, and access to important WSTS meetings.

In turn, your participation in the WSTS association helps further strengthen the market statistics WSTS provides. The same reports that are vital for WSTS member companies are also important for regional semiconductor associations, who advocate on behalf of the industry in their regions and for the industry as a whole.

WSTS has exclusive partnerships with the European Semiconductor Industry Association (ESIA), the Korean Semiconductor Industry Association (KSIA), the Japan Council, the Taiwan Semiconductor Industry Association (TSIA), and the Semiconductor Industry Association (SIA).

These organizations act as commercial distribution channels for WSTS reports and as client contacts for companies within the semiconductor supply chain and third parties.
Regional associations promote your industry

Regional semiconductor associations advocate on behalf of their local and regional semiconductor companies and support these companies’ needs and interests. They interact with government officials, trade and partner associations, the academic research community, and important industry stakeholders. They represent the semiconductor industry in areas such as tax, export controls, research & technology funding, intellectual property rights, environmental sustainability, and worker safety.

In dealing with a variety of audiences – some of whom might know very little about the semiconductor market – regional associations rely on WSTS statistics to provide crucial data that helps adequately represent the scope and size of the semiconductor industry. WSTS provides tangible figures to highlight the importance of your industry.

WSTS market statistics are a unique tool most industries and their respective associations do not have at their disposal. By participating in WSTS, member companies contribute to making WSTS market statistics the most current, comprehensive, and accurate data in the industry. By extension, WSTS members also help support data that is important to their regional associations – those very same associations that are advocating on their behalf.

Additional information

Several regional associations offer discounts for joint WSTS/regional association membership packages. Please contact your regional semiconductor association to find more information on how they are working to support the semiconductor industry, as well as on special membership discounts. An overview of regional semiconductor industry associations, along with contact information, is found on the following page.

“WSTS complements the other statistics that we provide very well. It is a strong, stable tool, which is updated regularly, offers clear product categories and, importantly, uses figures generated directly by the companies within the semiconductor industry. It is a vital source of information that we use when representing the size of the semiconductor market.”

Giovanni Corder
Trade and Statistics Manager
European Semiconductor Industry Association
## Overview of regional semiconductor industry associations

<table>
<thead>
<tr>
<th>Name of Organization</th>
<th>Countries and Regions</th>
<th>Contact Information</th>
</tr>
</thead>
</table>
| WSTS Japan Council                    | Japan                                                                                 | WSTS Japan Council
|                                       |                                                                                       | Hirotaka Kusama                                                                     |
|                                       |                                                                                        | Email h.kusama_wstsjc@air.ocn.ne.jp                                                 |
| ESIA (European Semiconductor Industry | European Union, Eastern Europe, Middle East, Africa                                    | EECA/ESIA                                                                          |
| Association)                          |                                                                                        | Diamant Building
|                                       |                                                                                        | Bd. A. Reyers 80                                                                    |
|                                       |                                                                                        | 1030 Brussels, Belgium                                                              |
|                                       |                                                                                        | Tel +32 2 706 86 00                                                                  |
|                                       |                                                                                        | Fax +32 2 706 86 05                                                                  |
|                                       |                                                                                        | Web [www.eeca.eu/esia/](http://www.eeca.eu/esia/)                                     |
| TSIA (Taiwan Semiconductor Industry   | Taiwan, China (incl. Hong Kong and Macau), Philippines, Malaysia, Indonesia            | TSIA                                                                               |
| Association)                          |                                                                                        | Room 1246, Bldg51, No. 195 Sec. 4,                                                  |
|                                       |                                                                                        | Chung Hsing Rd.                                                                     |
|                                       |                                                                                        | Chutung, Hsinchu,                                                                   |
|                                       |                                                                                        | Taiwan, 31040, R.O.C                                                                |
|                                       |                                                                                        | Tel +886-3-5913477                                                                  |
| KSIA (Korea Semiconductor Industry    | Australia, India, Myanmar, New Zealand, Singapore, Korea, Thailand                    | Korea Semi Indus Assoc.                                                             |
| Association)                          |                                                                                        | F Dong-IL, Building #107                                                            |
|                                       |                                                                                        | Yangjae-dong, Seocho-ku                                                             |
|                                       |                                                                                        | Seoul, Korea 137-130                                                                 |
|                                       |                                                                                        | Tel +82 2 576 3472-4                                                                 |
|                                       |                                                                                        | Web [https://www.ksia.or.kr](https://www.ksia.or.kr)                                |
| SIA (Semiconductor Industry Association)| North and Latin America, and the rest of the World                                  | SIA                                                                                |
|                                       |                                                                                        | Suite 450                                                                          |
|                                       |                                                                                        | 1101 K Street NW                                                                    |
|                                       |                                                                                        | Washington, DC 20005                                                                |
|                                       |                                                                                        | Tel +1 (202) 446 1700                                                               |
|                                       |                                                                                        | Fax +1 (202) 216 9745                                                               |
|                                       |                                                                                        | Web [http://www.sia-online.org/](http://www.sia-online.org/)                        |
Our Members

Americas regional group

• Allegro Microsystems
• Alpha & Omega Semiconductor
• Analog Devices, Inc
• Cypress Semiconductor Corp.
• Diodes, Inc.
• Littelfuse Teccor
• Maxim Integrated Products
• Micron Technology, Inc.
• ON Semiconductor
• Semtech Corp.
• Silicon Labs
• Texas Instruments, Inc.
• Xilinx, Inc.

European regional group

• Ampleon
• ams AG
• Fagor Electronica, S. Coop
• Infineon Technologies AG
• Lime Microsystems
• Micronas
• Nexperia
• NXP Semiconductors
• Robert Bosch GmbH
• STMicroelectronics
• Vishay Intertechnology, Inc.
Our Members

Japanese regional group
• Fuji Electric Co., Ltd.
• Mitsubishi Electric Corporation
• Panasonic Corporation
• Renesas Electronics Corporation
• Rohm Co., Ltd.
• Sanken Electric Co., Ltd.
• Seiko Epson Corporation
• Shindengen Electric Mfg. Co., Ltd.
• Sony Corporation
• Toshiba Corporation

Asia Pacific regional group
• eHiway microelectronics
• Korea Electronics Co., Ltd.
• Macronix International Co. Ltd.
• Rectron Ltd.
• Samsung Electronics
• SK Hynix Inc.
• Taiwan Semiconductor Co. Ltd.
• WeEn Semiconductors

July 2018
The origins of WSTS can be traced back to the middle of the 20th century, when a group of electronics manufacturers in the western United States – originally called the Western Electronic Manufacturers Association (WEMA) – first began collecting trade statistics for the electronics industry. Since then, WSTS has grown to cover the semiconductor industry across the world.

1977
Semiconductor Trade Statistics Program initiated by SIA
The Semiconductor Industry Association (SIA) took over administration of the semiconductor statistics portion of WEMA’s market information, called the Semiconductor Trade Statistics Program (STSP). Members of what at that time was still very much a fledgling industry recognized the growing importance of having accurate semiconductor market statistics. As the industry rapidly expanded, the demand for reliable regional and worldwide data grew as well.

1980
STSP began to collect data from other international regions
The STSP was enlarged to include all major European semiconductor manufacturers.

1986
WSTS Inc. was formed as a non-profit corporation, based in California, to provide data collection and member services worldwide
The STSP was restructured into the WSTS as an independent, non-profit corporation based in San Jose, California, USA, with the expressed purpose of mutually-beneficial collection and publication of semiconductor net trade statistics and forecasts for companies throughout the world.

2012
WSTS continues a 35-year tradition of semiconductor market statistics
The association has 55 member companies, representing eight of the top-10 largest semiconductor manufacturers and 18 of the world’s 25 leading IC companies.
Dependable partners help build a strong WSTS

Several partners support WSTS in the acquisition and distribution of its market statistics information. They have been chosen based on their extensive experience in their respective fields and the high-quality services they provide.

Data Collection Agents (DCAs)
WSTS has appointed regional DCAs who collect revenue data from our member companies and consolidate this data into regional base reports. The regional DCAs are reputable, long-standing accounting specialists, who keep individual member companies’ data in strict custody. Regional DCAs forward the regional base reports to our worldwide DCA, who consolidates this data and makes it available for access from WSTS member companies.

DCA for Europe
topserve.ch, based in Switzerland, specializes in collecting data for non-profit organizations and associations. topserve.ch collects and processes data from WSTS’ European member companies.

DCA for Japan
Grant Thornton Japan, an affiliate of Grant Thornton International, is one of Japan’s leading audit, accounting, tax, and business advisory firms and counts numerous public-interest entities and privately-held businesses among its clients. Grant Thornton Japan collects and processes data from WSTS member companies based in Japan.

DCA for the Americas, Asia Pacific, and the world
Moss Adams is a regional DCA for American and Asia-Pacific-based member companies and WSTS’ worldwide DCA. The firm has extensive experience serving electronics companies and is one of the top-100 largest accounting firms in the US.

Data preparation for history and trend reports
Tier One, a consultant company for special communication services led by Stuart Harris, accumulates data from WSTS reports and uses it to compile the Blue Book History report and to create the hundreds of graphs and trend charts used in the Green Book report.

Internet design, software development, and support
Kaindl Communications, an Austrian web-development company, has been WSTS’ internet partner since 2000. A small team of specialists created the WSTS Internet Portal and the editorial tools and sophisticated access-control system to run it effectively.

Forecast Program
Join(+) GmbH, a German business software specialist, developed the new WSTS forecast program used to prepare the spring and fall WSTS forecast.
Frequently asked questions

**Question:**
We do not like to give our revenue data to external parties. Is our data kept safe?

**Answer:**
Strict rules guarantee the safety of our member companies’ data. This information is aggregated by independent data collection agencies (DCAs), who follow stringent guidelines to assure the accuracy of the information and safeguard its privacy. DCAs are trusted and established accounting firms that have long, demonstrable track records in their fields. WSTS does not have access to individual companies’ figures.

**Question:**
Membership fees are high. Is it worth the money?

**Answer:**
Compared to the cost of hiring internal or external analysts or buying market research on the industry, WSTS membership prices are, in fact, quite inexpensive. Our members continually tell us WSTS is the most affordable source of market information in the industry and offers by far the best value for the money.

**Question:**
I can buy information about the semiconductor market from other sources, and they often base their models on WSTS data. Why should I join WSTS?

**Answer:**
It is true that market research firms often use WSTS data as the basis for their assumptions and predictions about the industry, but the information they provide is exactly that – an assumption. Aside from WSTS, there is simply no other source for semiconductor market information derived directly from the industry. In addition to having access to genuine market figures, members can interact with “real” industry experts, who understand the data and handle market research for their companies.

**Question:**
Can my competitors access WSTS data and extrapolate my company’s market share?

**Answer:**
WSTS adheres to important policies about how market statistics are presented in reports. Information from at least three companies must be used when reporting market statistics on any segment. In those few examples where market position might be revealed, WSTS uses specific product grouping so that data from any one company cannot be determined and remains private.
Frequently asked questions (continued)

**Question:**
Is WSTS data only a collection of revenue figures? What other benefits does WSTS offer?

**Answer:**
WSTS data provides not only revenue figures but also unit sales. Therefore, it allows you to monitor average sale price (ASP) – a benefit not found in most semiconductor market research. In addition, participation in WSTS meetings allows your company to learn how other semiconductor companies view the upcoming quarters and years, and to discuss new technologies and trends.

WSTS also offers convenient reports that look at product and sector trends, a quarterly by-country breakdown of unit sales and revenue figures, and an annual End-Use report that shows which components are being used in which products.

**Question:**
Isn’t it a problem to have all the competition together for forecast meetings?

**Answer:**
Strict guidelines determine what can be discussed at the meetings. Anti-trust measures are enforced to ensure members adhere to all anti-competitive conduct laws.

**Question:**
Is it difficult and time-consuming to submit monthly sales and revenue data each month?

**Answer:**
The vast majority of our members say that the product and segment categories we already use correlate well with the product designations at their companies. For most companies, submitting this data requires only minor adjustments to pre-existing figures. Those companies with less one-to-one correspondence between the figures usually set up an initial conversion template and then reuse this template to simplify the process.

**Question:**
The semiconductor industry is extremely fast-paced. How does WSTS keep up with this dynamic business landscape?

**Answer:**
We listen to our member companies. Our members decide which product categories should be used in reports and when up-and-coming technology areas should be included. Because of our member-based structure, WSTS information is created by semiconductor companies for semiconductor companies – not for the financial community, investors, or industry observers.
Learn more about WSTS

On the Internet:  [www.wsts.org](http://www.wsts.org)

Via E-Mail, telephone, or mail:
Bernd Schniggenfittig, WSTS Chief Executive Officer and Administrator, is available to answer specific questions about the association and WSTS membership:

**Bernd Schniggenfittig**  
E-Mail:  [bs@wsts.org](mailto:bs@wsts.org)  
Telephone: +49 (8062) 807 1261  
Fax: +49 (8062) 807 1262

**Postal address:**  
Fasanenstraße 12a  
83052 Bruckmühl  
Germany

**Company headquarters:**  
WSTS, Inc.  
4357 Esther Drive  
San Jose, CA 95124  
USA

Attending a WSTS meeting:
Prospective members may also participate in WSTS meetings by invitation. Information about the next Committee Meeting can be found on the WSTS website. Please contact Bernd Schniggenfittig or the organizers of specific regional meetings to request an invitation.

Becoming a WSTS Member:
Simply fill out the quick online [membership application form](#) available on the WSTS website to request membership.

You will be sent the WSTS Participants Manual, which outlines membership requirements.

You may also call Bernd Schniggenfittig to get your membership started, or if you have any questions about the application process.

“Individual opinions expressed in this presentation are those of the contributors and do not necessarily represent the views of the companies or organizations they work for nor those of WSTS, Inc.”