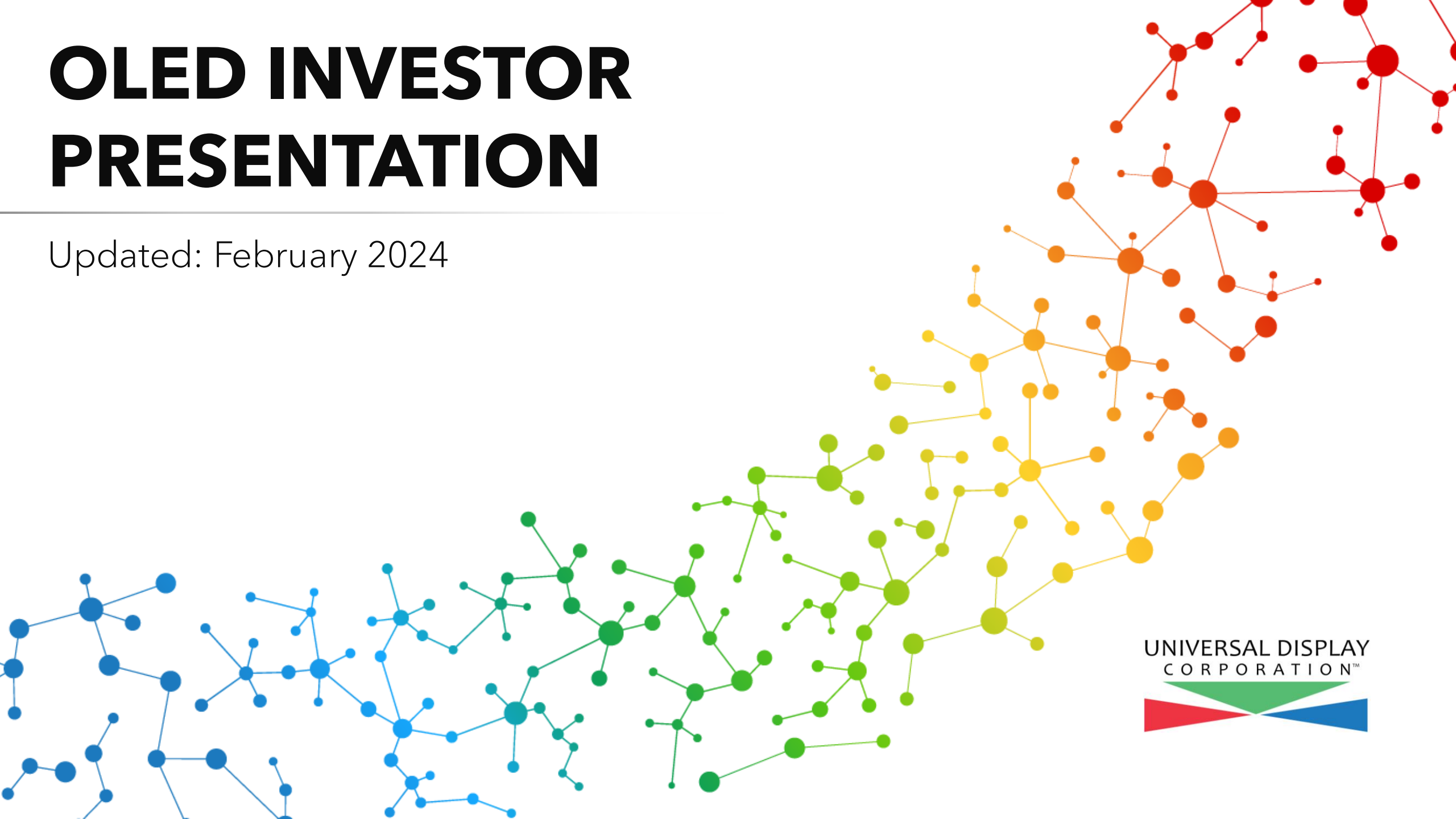


# OLED INVESTOR PRESENTATION

Updated: February 2024



# Forward-Looking Statements

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All statements in this document that are not historical, such as those relating to the projected adoption, development and advancement of the Company's technologies, and the Company's expected results and future declaration of dividends, as well as the growth of the OLED market and the Company's opportunities in that market, are forward-looking financial statements within the meaning of the Private Securities Litigation Reform Act of 1995. You are cautioned not to place undue reliance on any forward-looking statements in this document, as they reflect Universal Display Corporation's current views with respect to future events and are subject to risks and uncertainties that could cause actual results to differ materially from those contemplated. These risks and uncertainties are discussed in greater detail in Universal Display Corporation's periodic reports on Form 10-K and Form 10-Q filed with the Securities and Exchange Commission, including, in particular, the section entitled "Risk Factors" in Universal Display Corporation's Annual Report on Form 10-K for the year ended December 31, 2023. Universal Display Corporation disclaims any obligation to update any forward-looking statement contained in this document.

# Universal Display Corporation (UDC) Overview

## Who We Are

UDC (Nasdaq: OLED) is a leader in the research, development & commercialization of OLED technologies and materials for use in display and solid-state lighting applications.

- Founded in 1994
- Subsidiaries and offices around the world
- Since inception, Universal Display's innovation strategy has centered on building a strong foundation of best-in-class OLED materials and technologies.



OLED Pioneer Enabling Industry Growth



Leading Global Supplier of Energy-Efficient PHOLED Materials



Innovator with Robust IP Portfolio of 6,000+ patents issued and pending worldwide\*



Key Industry Partner Providing Support with Nearly 30-Years of OLED Expertise

# UDC: Strong Corporate Citizen



## UDC's Energy-Efficient Phosphorescent Materials

- 100% UniversalPHOLED® emitters save energy
- UDC's emitters do not use conflict minerals



## Diverse & Inclusive Workplace

- Geographic: from over 25 countries
- Gender: 22% female and 78% male\*
- Cultural diversity



## Board of Directors

- 38% female and 62% male\*
- Named a 2023 Champion of Board Diversity by The Forum of Executive Women



## Community Outreach

- Foster educational STEM initiatives
- Support community organizations
- Employee charity matching program



## ISO Certifications

- ISO 9001:2015 (quality)
- ISO 14001:2015 (environment)
- ISO 45001:2018 (health/safety)

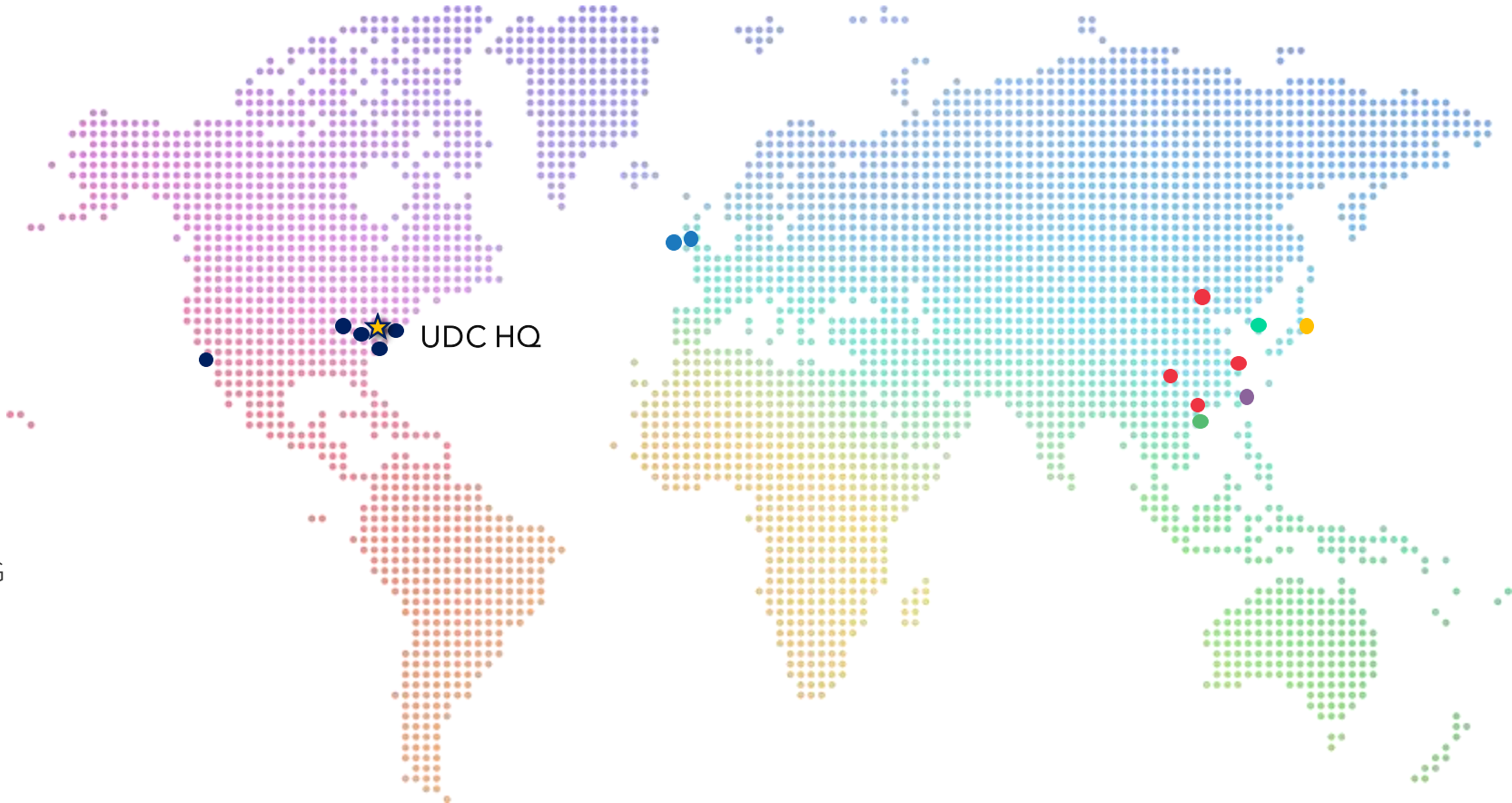


## Recognitions

- Newsweek: America's Greenest Companies 2024
- WSJ: The 250 Best-Managed Companies 2023

# UDC's Global Footprint

- United States**
  - UDC HQ (NJ)
  - Adesis, Inc. (DE)
  - OVJP Corporation (CA)
  - UDC Ventures LLC (NY)
  - PPG (PA & OH)
- UDC China**
- UDC Hong Kong**
- UDC Ireland**
  - OLED Material Manufacturing Ltd (OM<sup>2</sup>) & PPG
- UDC Japan**
- UDC Korea**
- UDC Taiwan**



More Than  
**450**  
Employees

Including more than  
**320**  
Scientists, engineers and technicians

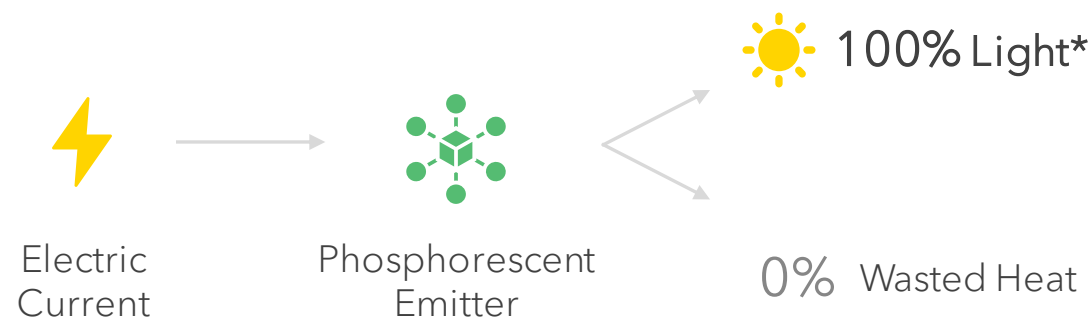
# UniversalPHOLED® = Energy Efficiency

UDC's patented and award-winning phosphorescent OLED technology and materials are integral to enabling low power consumption in OLED displays and lighting.

## Key Benefits of Phosphorescent Emitters

- Enable energy efficiency
- Reduce requirements for heat dissipation components
- Increase lifetime
- Lower product cost

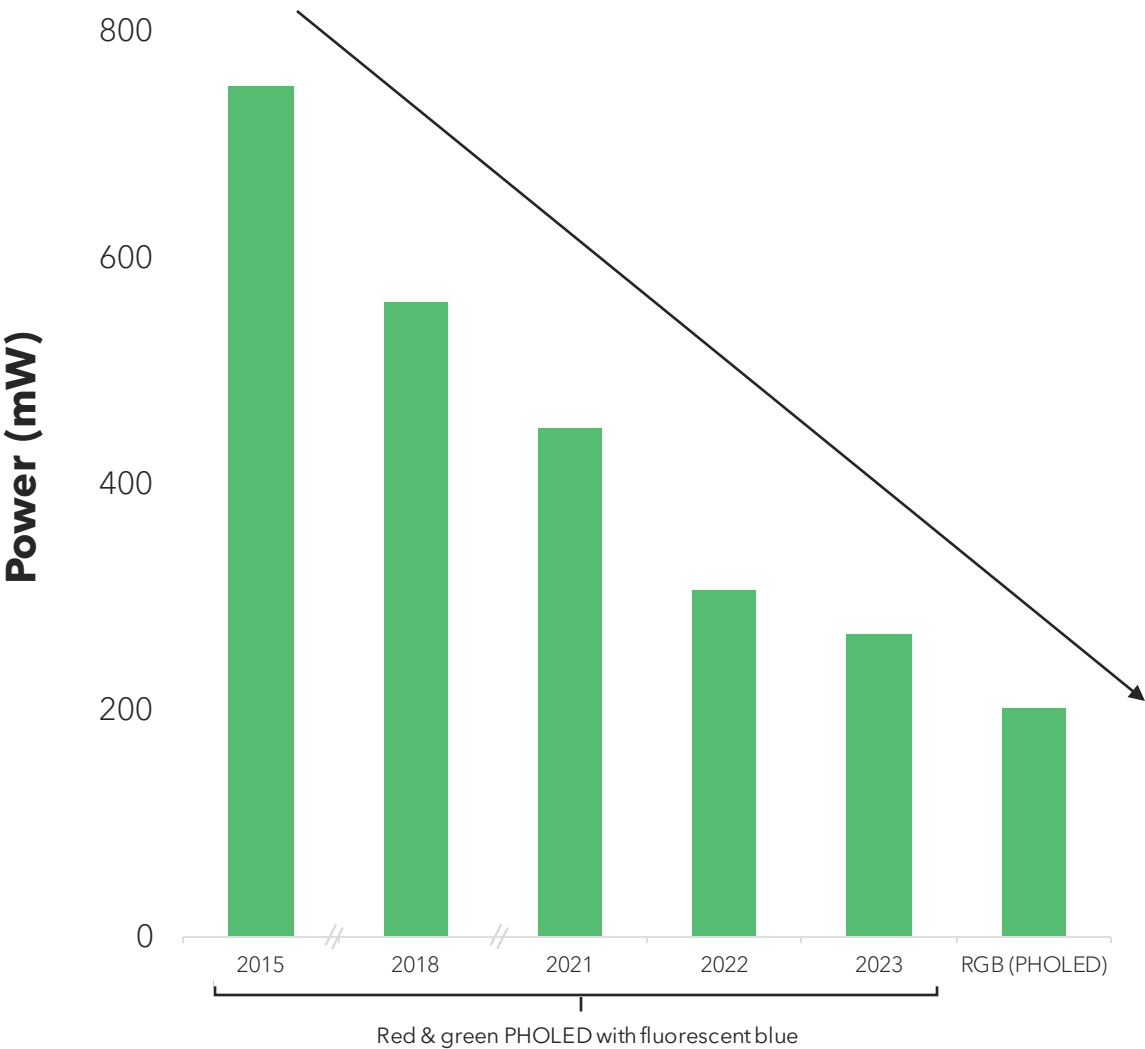
## Cornerstone: Phosphorescent OLED (PHOLED) Innovation Energy Efficiency



With trailblazing energy efficiency:  
Up to **4x** the efficiency of fluorescent OLED

\*100% Internal Quantum Efficiency  
*Baldo et. al., Nature, 395, 151 (1998)*

# UniversalPHOLED® Energy Efficiency Innovation



## Smartphone Display Power Consumption

### Current performance (2023)

Red & green PHOLED w/ fluorescent blue



↓ **64%**

Energy consumption compared to 2015

### Projected additional performance improvement

Full red, green & *blue* PHOLED vs. Prior devices containing fluorescent blue



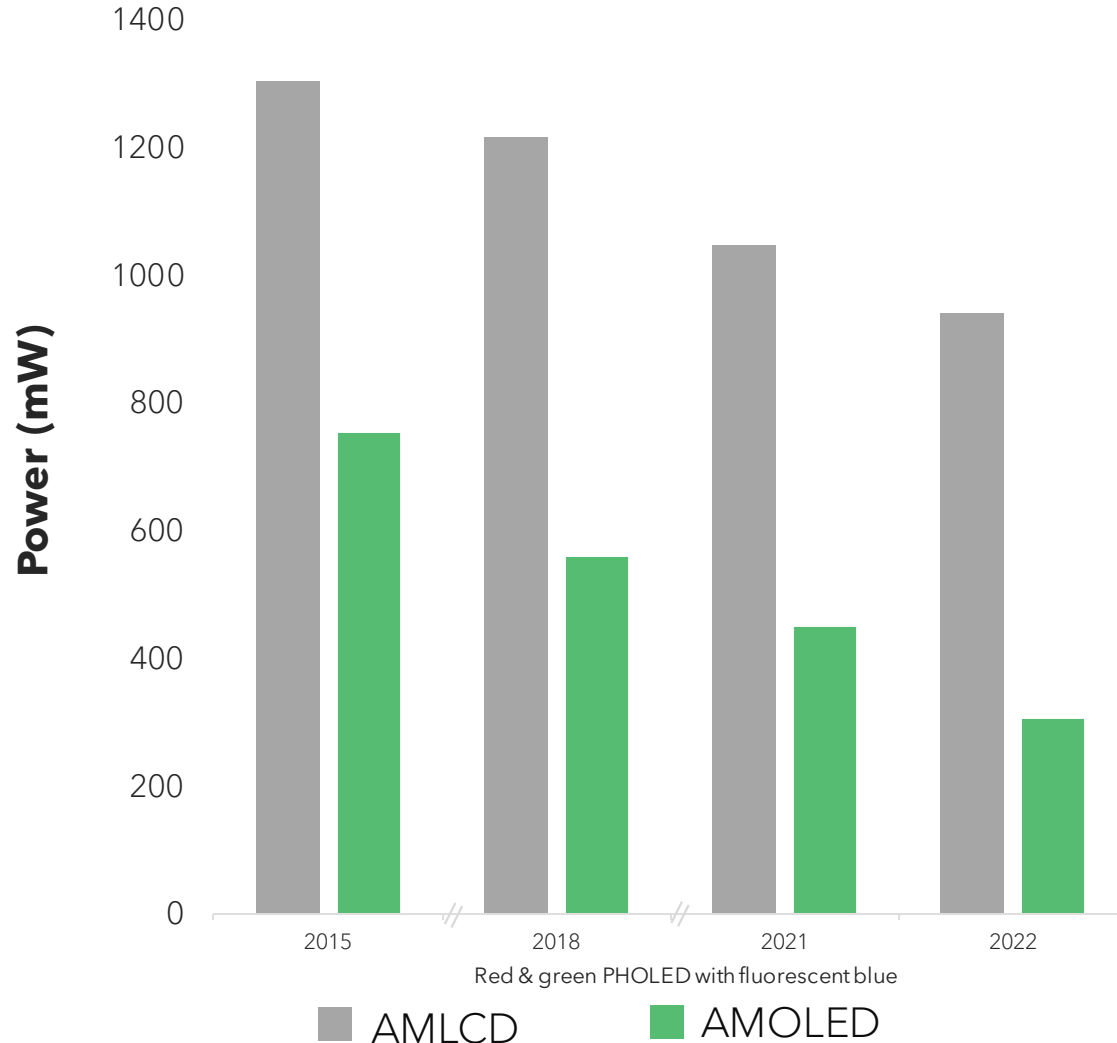
↓ **24%**

Energy consumption compared to 2023

Based on a 5.0" OLED display and comparable contrast LCD operating at 600 cd/m2 with video (50% pixels on). PHOLED data is based on UDC estimates. PHOLED=Phosphorescent



# UniversalPHOLED® Energy Efficiency Innovation



## Smartphone Display Power Consumption

PHOLED is up to **3x** more energy efficient than LCD.

While both technologies continue to make efficiency gains, PHOLED is widening the energy efficiency gap.

Based on a 5.0" OLED display and comparable contrast LCD operating at 600 cd/m<sup>2</sup> with video (50% pixels on). PHOLED data is based on UDC estimates. PHOLED=Phosphorescent



# Phosphorescent OLED Carbon Savings



## Calculated assumptions

There are at least 1.8 billion active OLED smartphones using our PHOLED materials and technology in the world today and:



Average use is 4 hours per day



Average luminance at 600 nits with 50% pixels on



Power savings is 30% over LCD



## Power savings



Power saving per display is 0.46W



Total savings per year is an estimated 1,216 GW-h per year

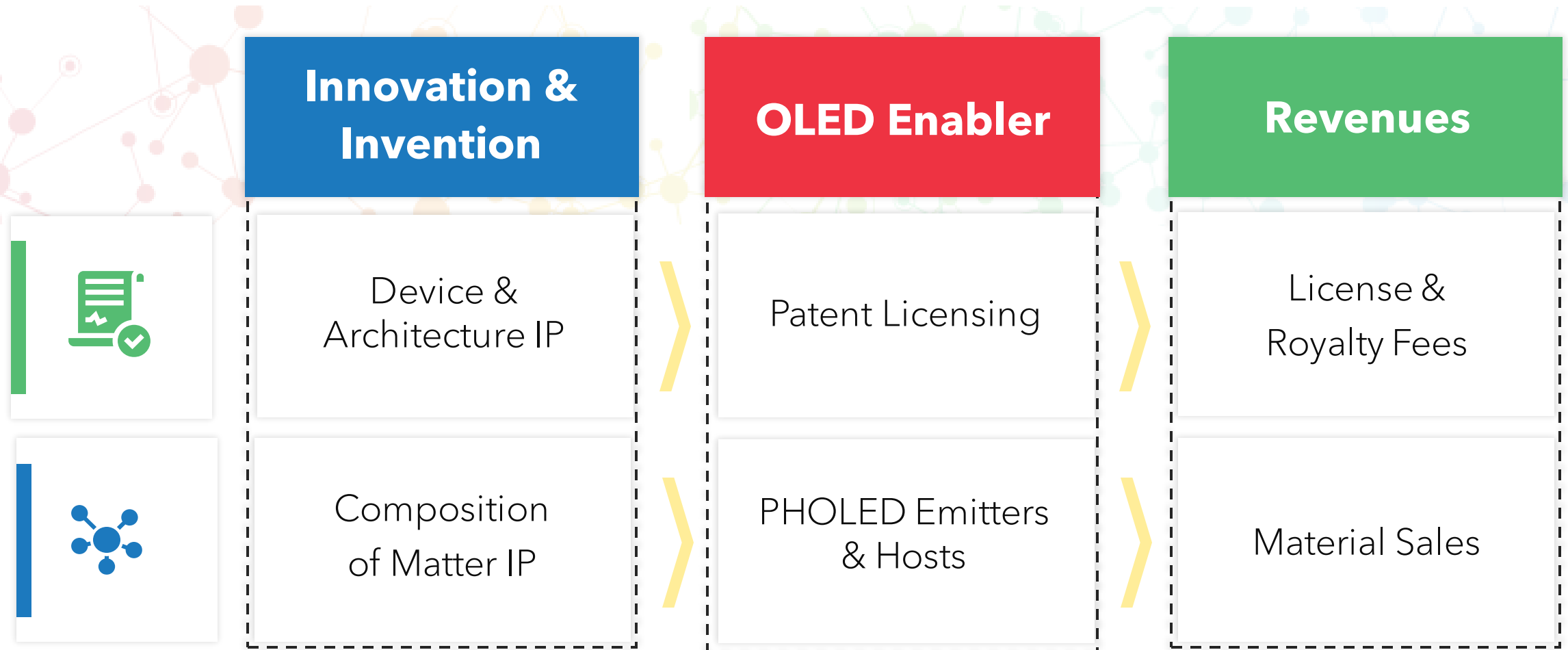


861,758 Metric tons of carbon dioxide (CO<sub>2</sub>) equivalent avoided per year\*



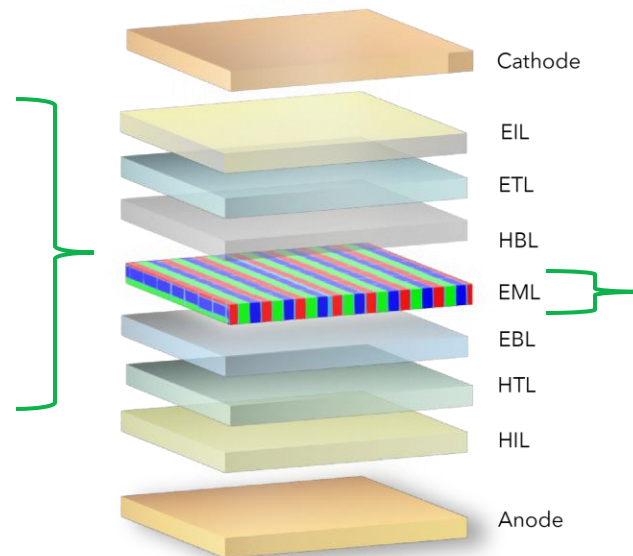
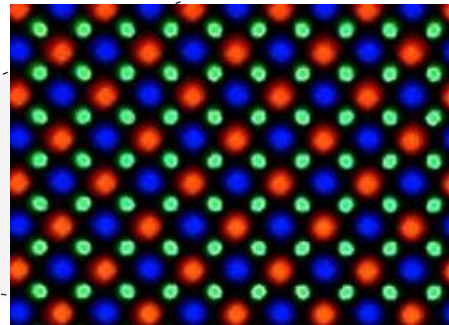
Equivalent to carbon sequestered by 14,249,241 tree seedlings grown for 10 years\*

# UDC's Business Model



# What Is an OLED?

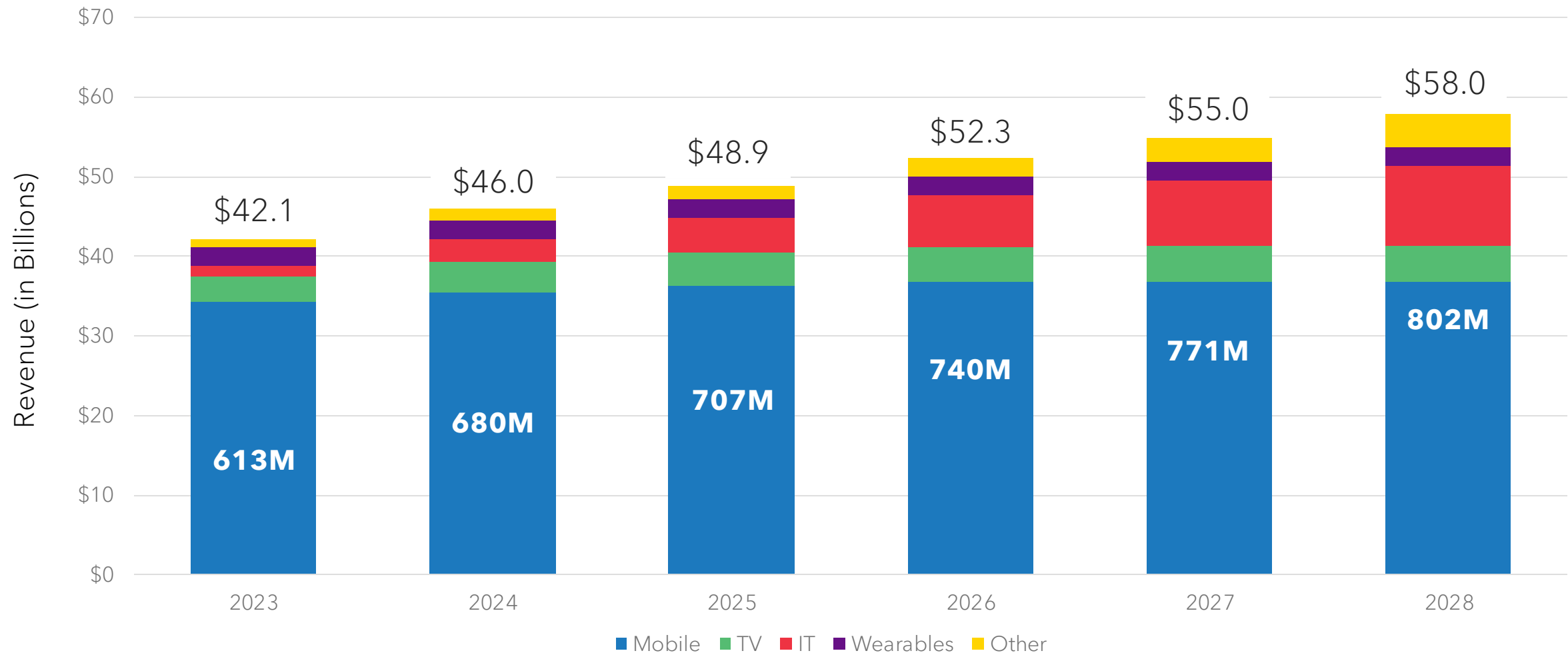
- An Organic Light Emitting Diode is a series of organic thin films between two conductors
- When electrical current is applied, bright light is emitted
- OLEDs can be used for displays and lighting
- OLEDs are not just thin and efficient - they can also be made **flexible** and **transparent**



## UniversalPHOLED® Materials in Emissive Layer

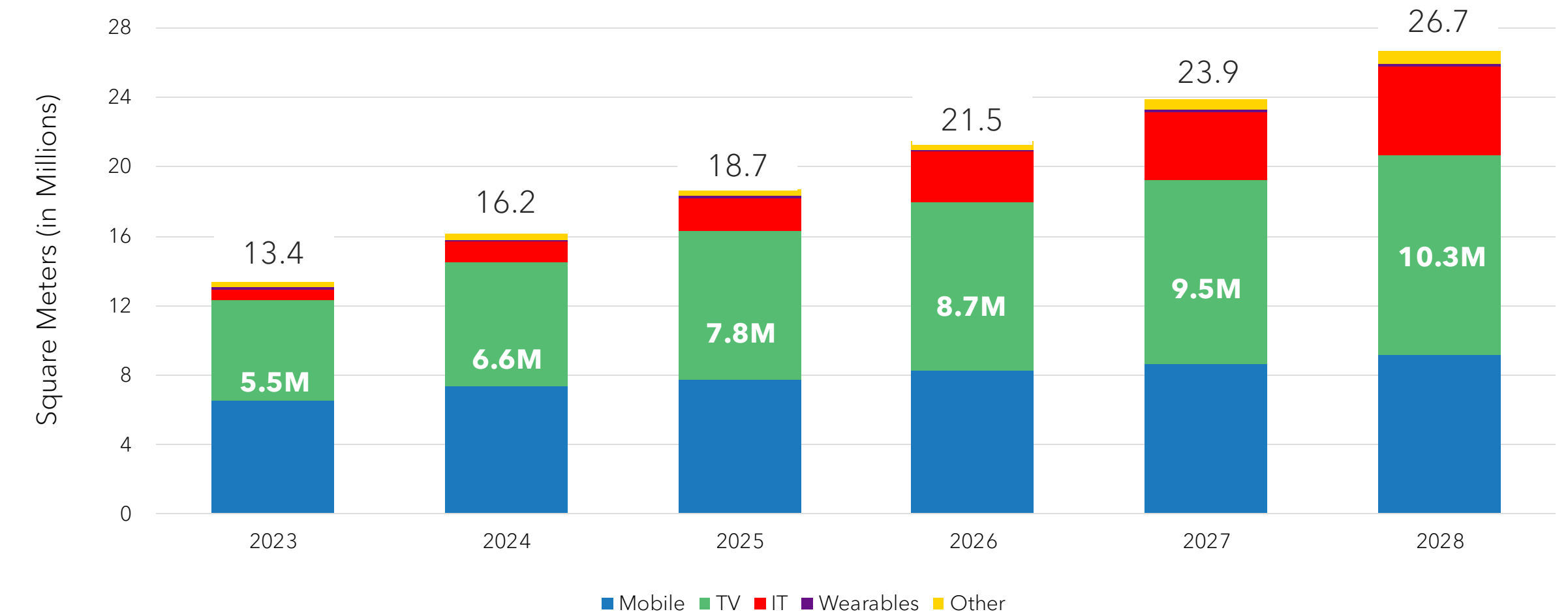


# OLED Display Market Potential



Unit numbers are for OLED smartphones only  
Source: Omdia OLED Display Market Tracker - Q3 2023 (January 2024)

# OLED Display Panel Demand



Unit numbers are for OLED TVs only  
Source: Omdia OLED Display Market Tracker - Q3 2023 (January 2024)

# Strong OLED Display Market Drivers

## Lower Power Usage



- **RED** Phosphorescence reduces power consumption by 25%
- Add **GREEN**: 45% cumulative reduction
- Add **BLUE**: 75% cumulative reduction
- Enabled by PHOLEDs

## Superior Aesthetics



- Improved image quality
- Thin and Light
- 180 degree viewing angle
- Near infinite contrast ratio (true black)
- Real-time video speeds (great for 3D)
- Self-emissive display
- Low UV output
- Minimal bezel
- Flexible

## More Cost Effective



- Fewer manufacturing process steps
- Lower bill-of-materials
  - No backlight required
  - No color filter required
  - No liquid crystal required
  - Reduced driver IC costs
- Enables non-glass substrates

# OLED Smartwatches & Smartphones



Samsung Galaxy Watch6



Motorola Moto Watch 200



Honor Choice Watch



Apple Watch Series 9



Xiaomi Watch S3



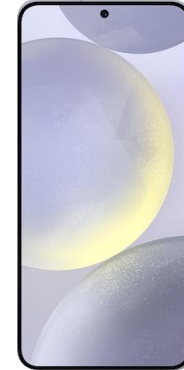
Garmin Forerunner 165



OPPO Reno11 F



vivo V30 Lite



Samsung Galaxy S24



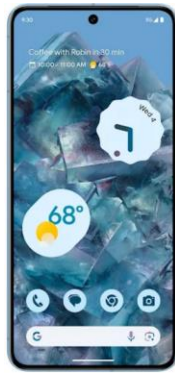
iPhone 15 Pro



Honor Magic6



Motorola Edge



Google Pixel 8 Pro



Tecno Spark 20 Pro+



Meizu 20 Classic



Huawei Nova 12



OnePlus 12



Xiaomi 13T



# More OLED Products



Samsung S95C



LG OLED evo G3



LG 4K Transparent OLED T TV



Sharp Roku TV OLED



LG 39" UltraGear™ OLED curved gaming monitor



Alienware 34" curved QD-OLED gaming monitor



ASUS ROG Zephyrus G16



Samsung Galaxy Tab S9, S9+ and S9 Ultra



PlayStation VR2



Apple Vision Pro

# Automotive OLED Displays & Lighting



2025 Hyundai Genesis  
GV80



2025 MINI Countryman SE EV



BYD's Yangwang U8 Premium  
Edition Hybrid



Mercedes EQS  
OLED MBUX Hyperscreen



Mercedes-Benz

# Form Factor: Flexible, Foldable, Rollable



LG OLED R Rollable OLED TV



Samsung Display Flex Note Extendable (CES 2024)



Asus Zenbook 17 Fold



Google Pixel Fold



Samsung Galaxy Z Fold5



Samsung Galaxy Z Flip5



vivo X Fold2



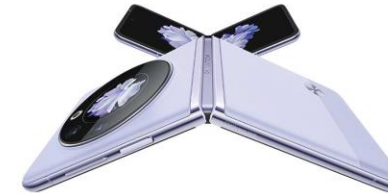
OPPO Find N3



Xiaomi Mix Fold 3



Honor Magic V2



Tecno Phantom V Flip



OnePlus Open



# LCD vs. OLED



- Lower BOM (bill of materials)
- Better Performance, More Efficient
- Thinner and Flexible Form Factor
- Vivid Colors and Superior Contrast Ratio

Image based on illustration from LG

# Groundbreaking Organic Vapor Jet Printing (OVJP)



Organic Vapor Jet Printing enables deposition of patterned organic films without a fine metal mask



OLED materials and substrate are the same as in today's proven mass production VTE process

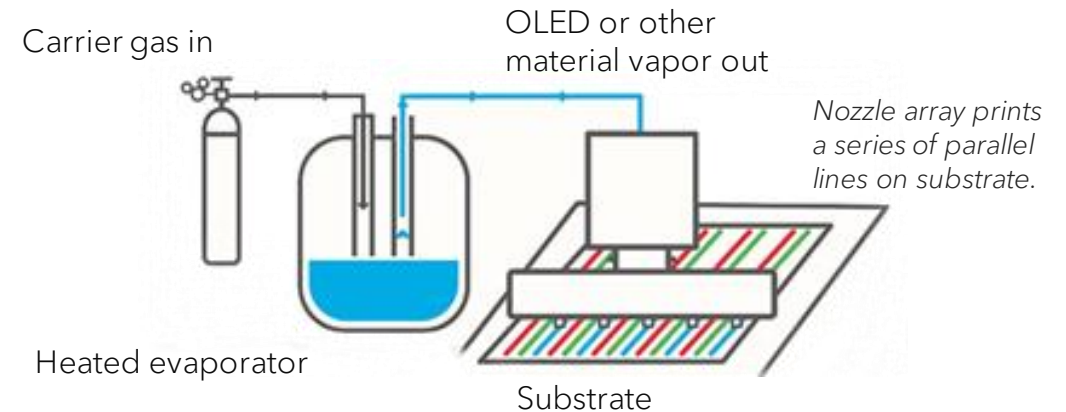


Direct pattern RGB SBS Top Emission

- Lower manufacturing cost
- VTE equivalent device performance
- Meets Advance TV Requirements



Enables advanced device layer architecture to support TV roadmap



Supports 4K and 8K resolution  
Applies to thermally vaporizable organic molecules

## Benefits:

- Cost-effective
- High throughput
- Dry printing
- Highly scalable
- Digitally controlled patterning
- Precise thickness control
- Co-deposition and multilayer printing
- Multiple deposition layers in one chamber

# Strong OLED Lighting Market Drivers

## Energy-efficient & environmentally friendly



- Low drive voltage
- Low operating temperatures, cool to touch
- Long lifetime
- Easy to control

## Highly desirable color quality



- Wide range of CCT, high CRI possible
- Color tunable
- Instant "ON" , Dimmable without flicker
- No glare, no noise
- Low UV content

## Form factor & low-cost potential



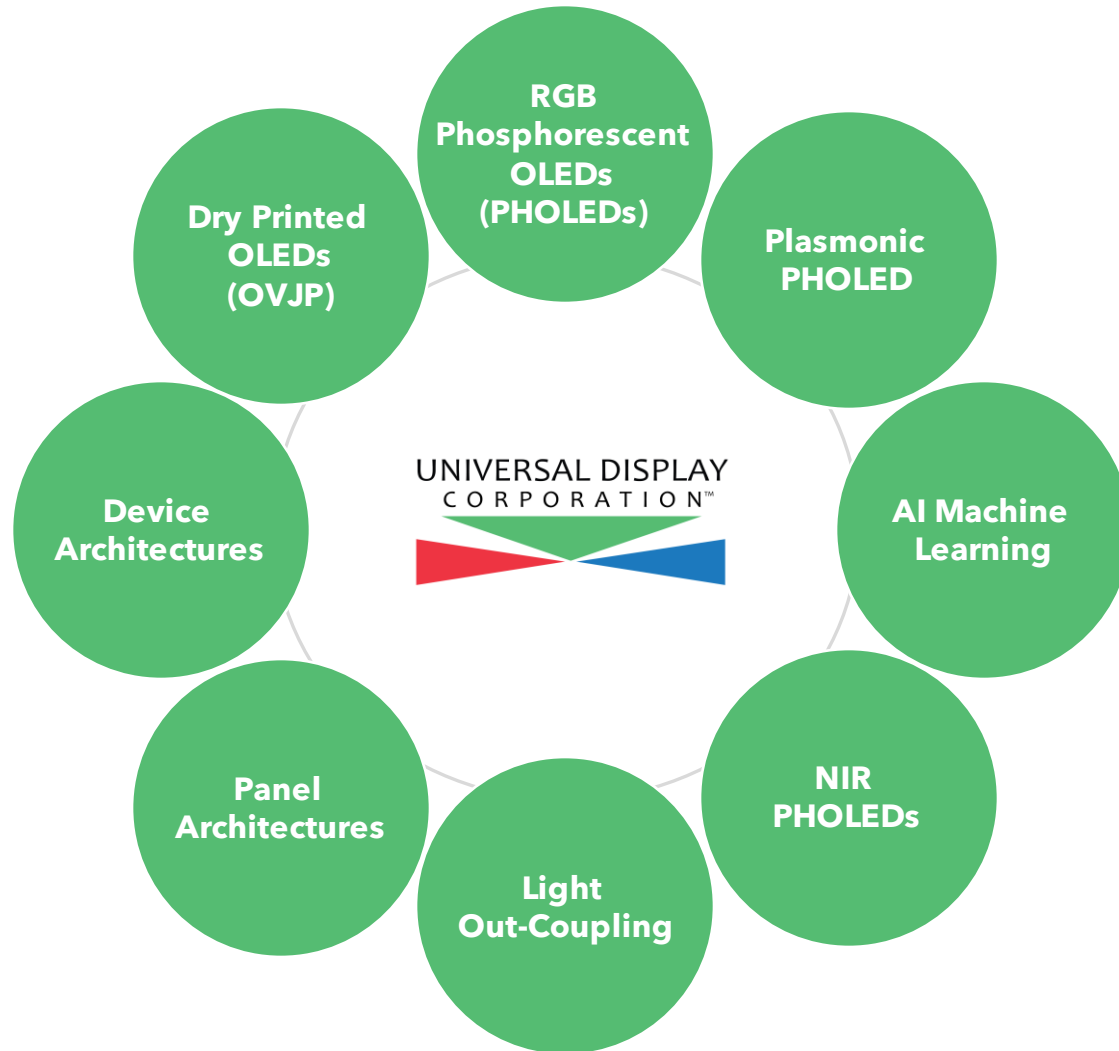
- Thin and lightweight
- Transparent
- Non-breakable, Conformable, Flexible, Foldable, Rollable
- Scaling advantage
- Roll-to-roll process

# OLED Lighting Around the World





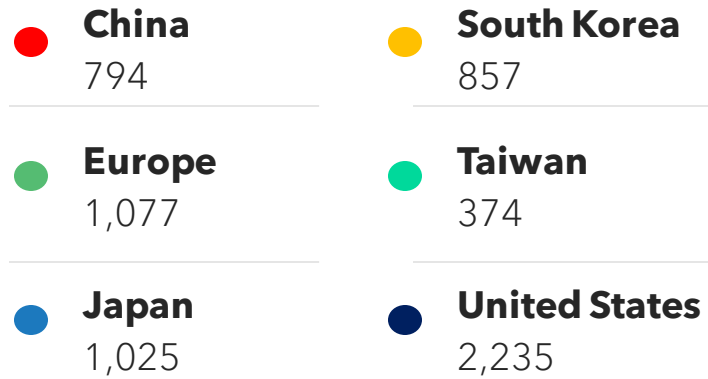
# Strong, Broad and Deep Patent Portfolio



- We develop and license enabling technologies that are at the heart of consumer OLED products worldwide, from AR/VR, smartwatches, smartphones, IT, automotive and TVs to lighting products.
- We believe that our extensive portfolio of patents, trade secrets and non-patented know-how enable our leadership position in the OLED ecosystem.
- Our R&D innovations allow us to continuously bolster the depth and breadth of our global OLED intellectual property framework, which currently stands at more than 6,000 issued and pending patents worldwide (as of May 30, 2023).

# Global Patent Portfolio

6,000+ Worldwide Patents Issued & Pending



Map source: UDC figures as of May 30, 2023

# Strategic Display & Lighting Partnerships

AUO



BOE



SHARP



Lumiotec



INNOLUX



TCL CSOT



Kaneka



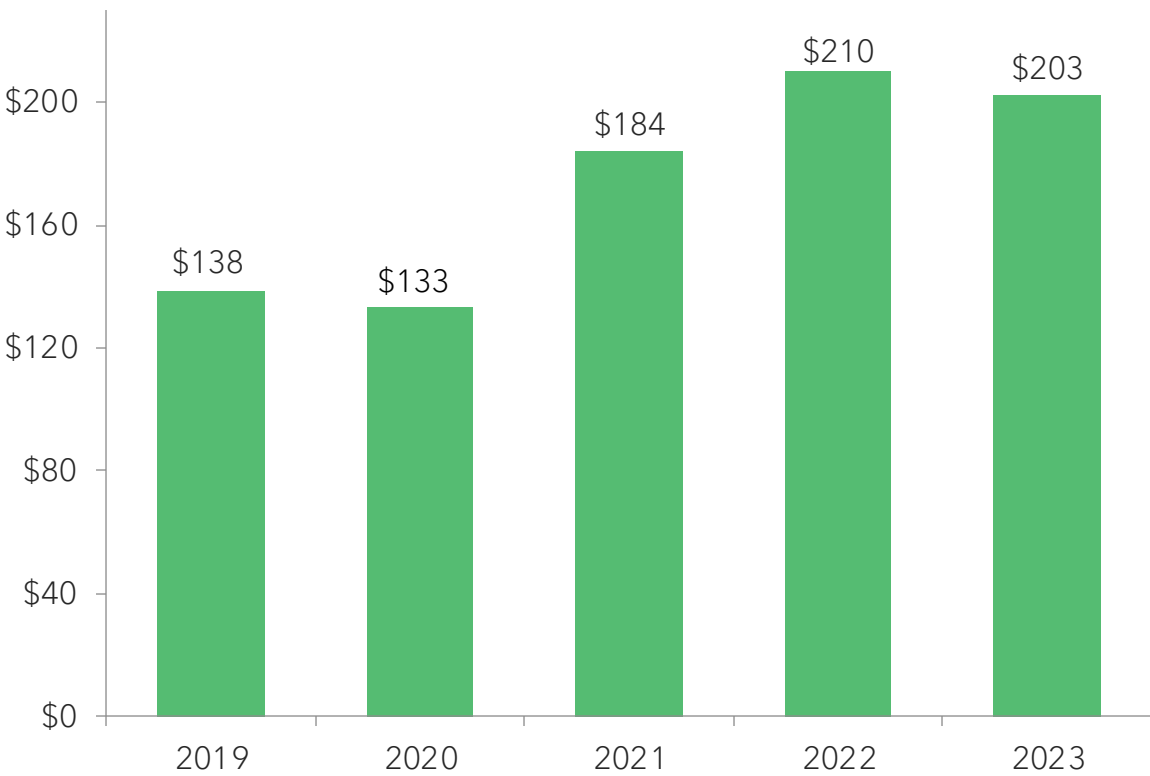
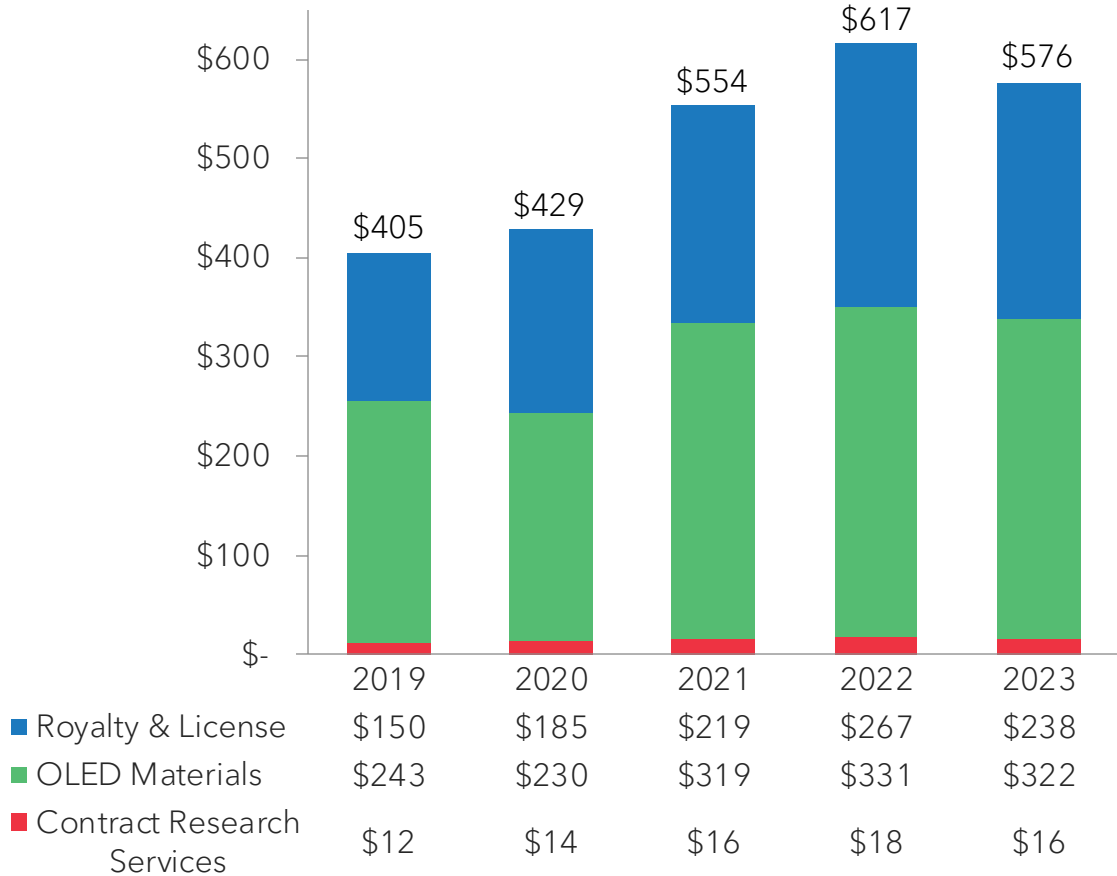
Visionox

# Historical Financial Performance

## Revenue

## Income

(\$ in millions)



# Robust Capital Structure

*In thousands, except share data*

	December 31, 2023
Cash, Cash Equivalents, Short-Term and Long-Term Investments*	\$799,624
Total Assets	\$1,668,961
Long-Term Debt	--
A/P and Accrued Liability	\$63,013
Deferred Revenue	\$59,719
Shareholders' Equity	\$1,447,226
Total Shares Outstanding	47,657,854

\*Please refer to our recent 10-K filing for information regarding minority investments.

# Company Summary

## Lighting up the OLED Revolution

### OLED Leader

- Inventing, Developing and Commercializing Proprietary Phosphorescent OLED Technologies & Materials to enable *Display* and *Lighting* Manufacturers
- Fabless Model; Partnering w/ PPG for 20+ Years
- ~456 Employees (321 R&D, 143 PhDs); Largest Global PHOLED Team\*

### Strong Financials

- \$800M Cash, No Debt\*
- \$16.78 in Cash/Share\*
- High Margin Business
- Lean Operating Model

### Comprehensive & Robust IP

- Largest Phosphorescent OLED (PHOLED) Technology & Materials Portfolio
- More than 6,000 Issued & Pending Patents Worldwide and Growing

### Blue-Chip Customer Base

- Displays: Samsung, LG Display, BOE, Tianma, CSOT, Visionox, Sharp
- Lighting: Kaneka, Konica Minolta, Lumiotec, OLEDWorks, Sumitomo Chemical
- Partnering with *more than* 25 companies

\*As of December 31, 2023