Welcome to

Devens, Massachusetts

- Largest fully integrated solar panel manufacturing facility in North America
- Size = 450,000 sf. under roof
- Annual Output = 160 megawatts
- Employees = ~650
- Quad Furnaces = 400 (design)
- Miles of String Ribbon per year = 8000
- Total Solar Panels per day = 2000

The Solar Industry

On Grid

- Environmentally driven market, largely subsidized
- Applications
  - Residential
  - Commercial / industrial
  - Roof tiles & building products

Rural Electrification

- Targeting 2 billion people worldwide without electricity
- Applications
  - Solar home systems
  - Village power
  - Water pumping
  - Commercial / industrial

Wireless Power

- Lowest cost, highest reliability solution for remote requirements
- Applications
  - Remote homes
  - Recreation vehicles
  - Telecom / instrumentation
  - Remote lighting

Progress Since 1994

Licensing of the technology by Evergreen Solar, Inc.

1994

Public Listing

2000

Evergreen-1 Marlborough, USA 3-15 MW capacity

2001

Rick Feldt appointed CEO & President

2003

Gemini II Furnace Commercialised

2004

European ManufacturingJV Deal signed

2005

Accelerating Growth

Spruce Line™ Product Launched

EverQ-2 Thalheim, Germany 60 MW completed

Evergreen-2 Devens, USA 160 MW operating

EverQ-1 Thalheim, Germany 35 MW capacity

Next Generation Quad Furnace Launched

New String Plant in Michigan

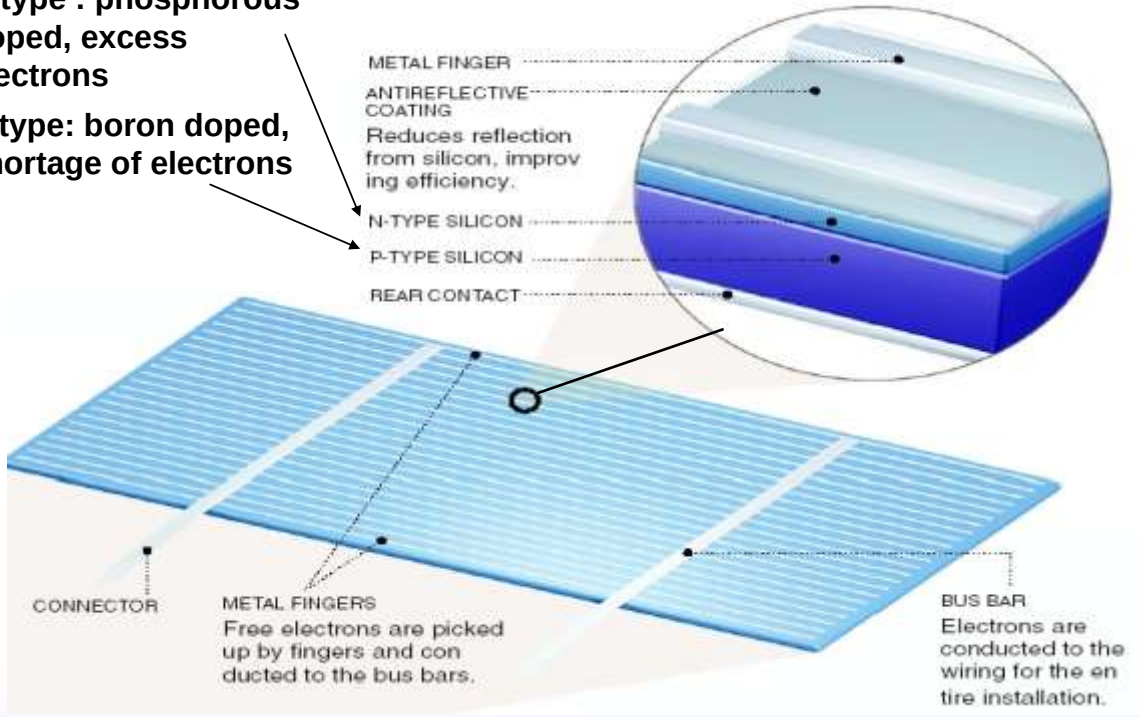
China 2010

2006 **2007** **2008-2009**

How photovoltaic solar power works

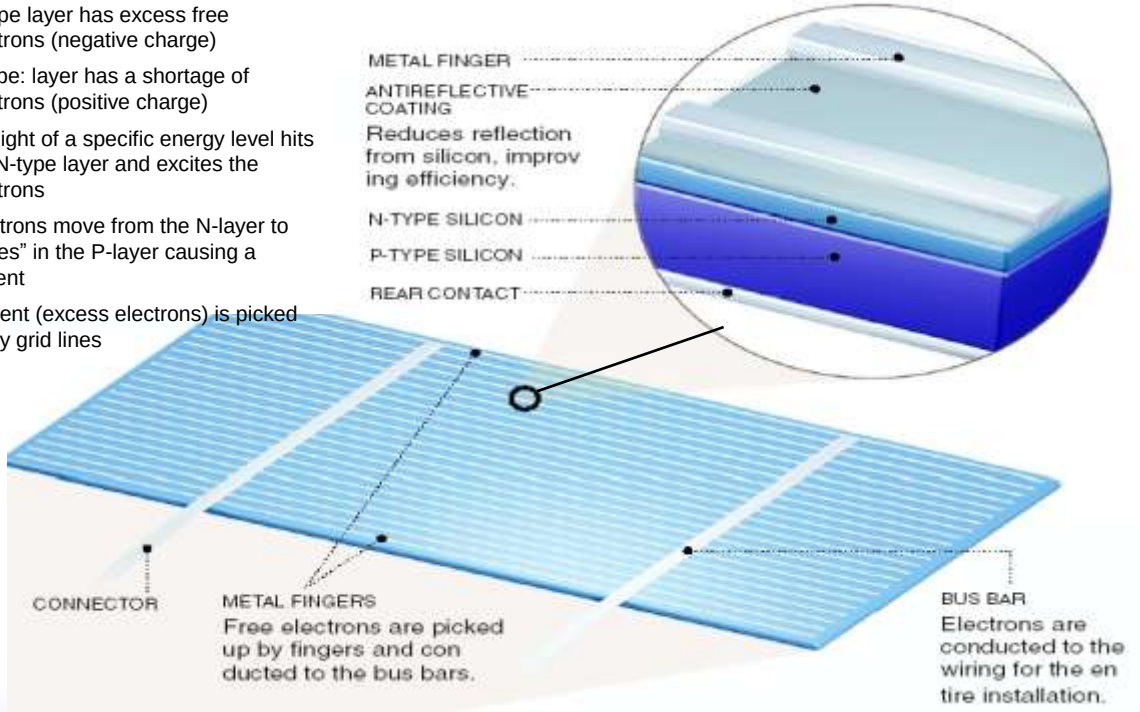
Solar Cells: basic building block of a panel

- **N-type : phosphorous doped, excess electrons**
- **P-type: boron doped, shortage of electrons**

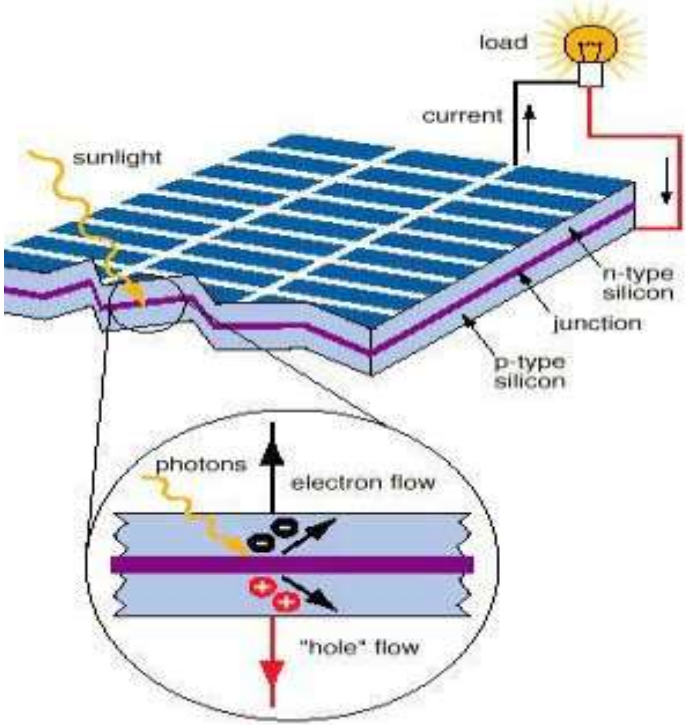


n-p junction diode

- N-type layer has excess free electrons (negative charge)
- P-type: layer has a shortage of electrons (positive charge)
- Sunlight of a specific energy level hits the N-type layer and excites the electrons
- Electrons move from the N-layer to “Holes” in the P-layer causing a current
- Current (excess electrons) is picked up by grid lines

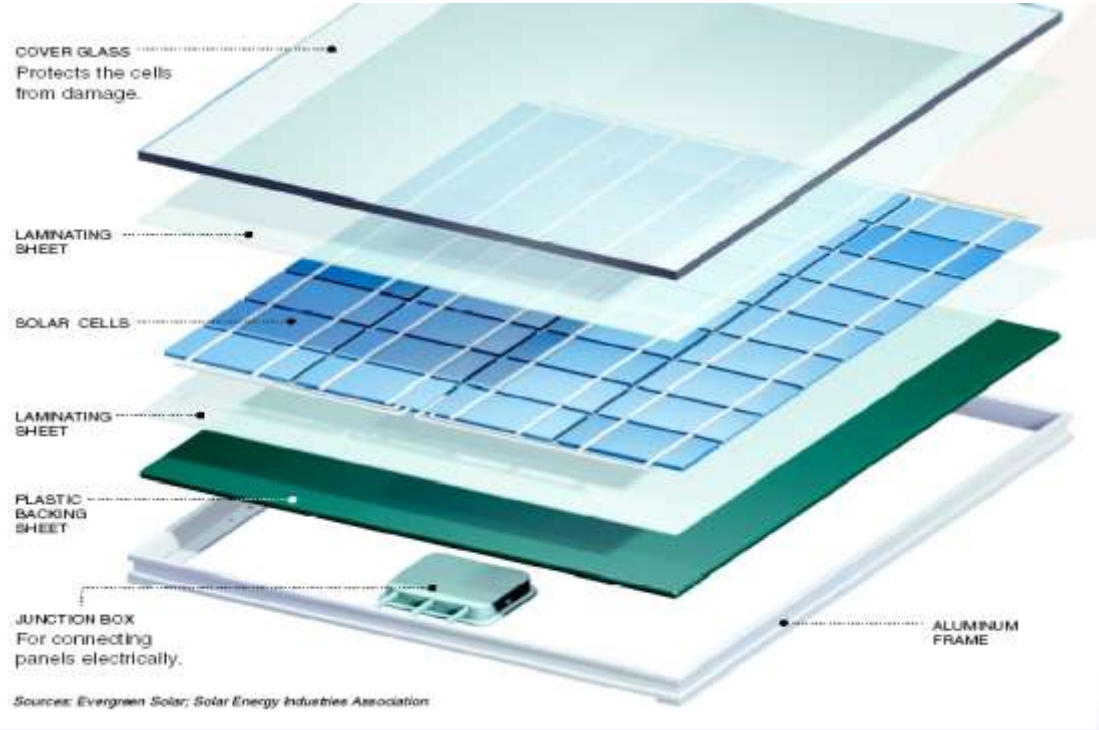


- N-type layer has excess free electrons (negative charge)
- P-type: layer has a shortage of electrons (positive charge)
- Sunlight of a specific energy level hits the N-type layer and excites the electrons
- Electrons move from the N-layer to “Holes” in the P-layer causing a current
- Current (excess electrons) is picked up by grid lines



Manufacturing Process

Solar Panels



Three main manufacturing steps

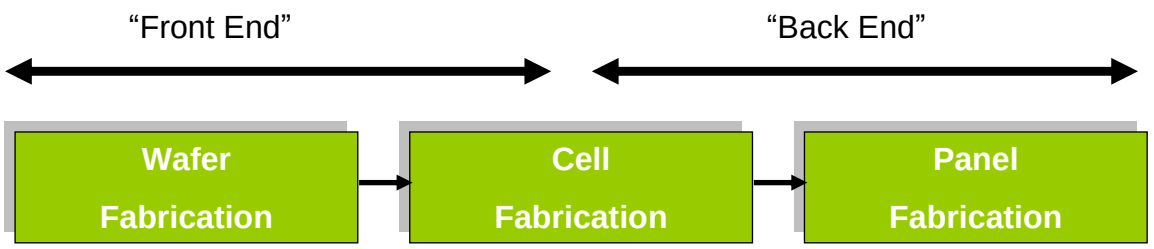
Wafer Fab → **Cell Fab** → **Panel Fab**

Silicon to Wafers

Wafers to Cells

Cells to Panels

Focus on Wafer Fab: Silicon to Wafers



Silicon Preparation

Silicon Ribbon Growing

Wafer Inspection

Texture Etching

Surface Diffusion

Glass Etch

Anti Reflective Coating

Screen Printing

Edge Isolation

Cell Testing & Sorting

Tabbing & Stringing

Lay-up

Lamination

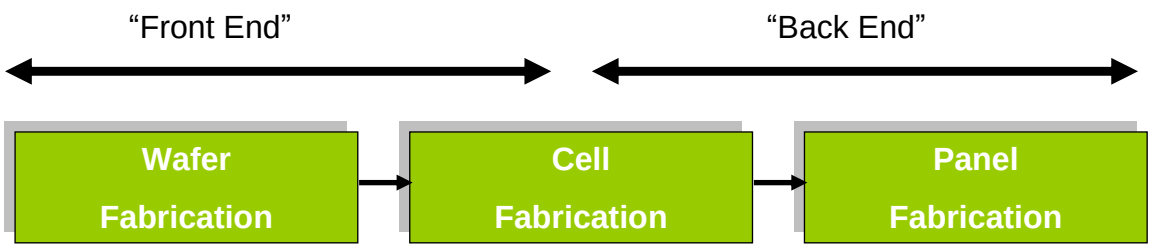
Trimming & Framing

Junction Box Installation

Inspection & Testing

Packing & Shipping

Focus on Cell Fab: Wafers to Cells



Silicon Preparation

Silicon Ribbon Growing

Wafer Inspection

Texture Etching

Surface Diffusion

Glass Etch

Anti Reflective Coating

Screen Printing

Edge Isolation

Cell Testing & Sorting

Tabbing & Stringing

Lay-up

Lamination

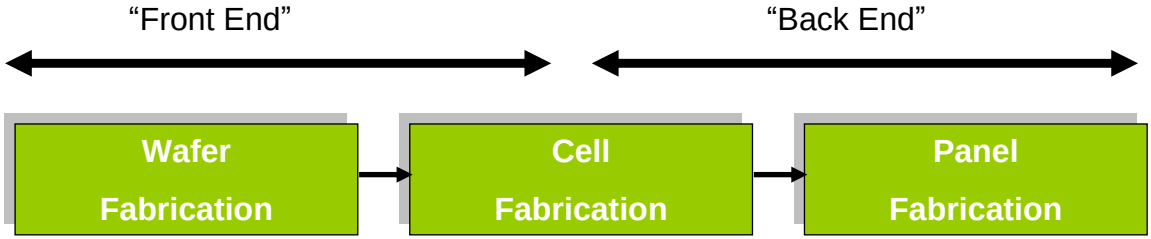
Trimming & Framing

Junction Box Installation

Inspection & Testing

Packing & Shipping

Focus on Panel Fab: Cells to Panels



Silicon Preparation

Silicon Ribbon Growing

Wafer Inspection

Texture Etching

Surface Diffusion

Glass Etch

Anti Reflective Coating

Screen Printing

Edge Isolation

Cell Testing & Sorting

Tabbing & Stringing

Lay-up

Lamination

Trimming & Framing

Junction Box Installation

Inspection & Testing

Packing & Shipping