Solar Cells

Development | Distribution | Future Scope

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Solar cells convert light energy to electricity

- Solar cells harness the photovoltaic effect to convert incident sunlight (photons) directly into electricity (voltage).
- They are the building blocks of solar panels.
Solar cells are layers of materials that produce the photovoltaic effect

- First cell was with selenium on a thin layer of gold
- First silicon solar cell
- Hoffman Electronics introduced a solar grid contact
There are 3 prominent types of solar cells currently used

<table>
<thead>
<tr>
<th>Monocrystalline Photovoltaic (PV) Cells</th>
<th>Polycrystalline PV Cells</th>
<th>Thin Film PV Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made from a single crystal of silicon</td>
<td>Made from multiple crystals of silicon fused together</td>
<td>Made from thin layers of material placed onto a supporting material like glass or metal</td>
</tr>
</tbody>
</table>


Unique energy market conditions resulted in rapid growth for solar cell use

Photovoltaic effect - Edmund Becquerel
First PV module - Bell Laboratories
Space Exploration

Price reductions helped proliferation
Energy crisis in 1970s
Non space applications
Rapid growth in present day
The solar cell lab demonstrated the steps required to manufacture a unit solar cell from berry juice.
Solar cells created using different berry juices were tested for efficiency.

<table>
<thead>
<tr>
<th>Name</th>
<th>Efficiency (%)</th>
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</thead>
<tbody>
<tr>
<td>Quinn</td>
<td>.064%</td>
</tr>
<tr>
<td>Nathan</td>
<td>.042%</td>
</tr>
<tr>
<td>Noel &amp; Stephanie</td>
<td>.061%</td>
</tr>
<tr>
<td>Maansi</td>
<td>.015%</td>
</tr>
<tr>
<td>Adit</td>
<td>.058%</td>
</tr>
<tr>
<td>Ethan</td>
<td>.052%</td>
</tr>
</tbody>
</table>

The US Department of Energy has an active role in establishing policy to promote use of solar energy.

Enabling Extreme Real-Time Grid Integration of Solar Energy (ENERGISE)

- Device and Local Control Layer
- Telecommunications and Data Layer
- Traditional System Layer
- Enhanced System Layer


Active research is being carried out for future predictions and problem mitigation for solar energy by 2050

Positive predictions
- Decreased cost
- Increased efficiency
- Better utilization of space
- Better storage of solar energy

Negative predictions
- Uncertain future market conditions
- Public policies
- Storage issues

Solar energy is an environment friendly sustainable source of energy with great prospects for wide use in the near future.