



The atom is a source of tremendous energy. Energy from the sun is the result of the nuclei of atoms splitting or combining, converting matter to energy. We harness that mechanism to generate power in nuclear reactors. Photovoltaic cells make the direct conversion of light into electricity through a photoelectric effect that causes certain materials to absorb photons of light and release electrons. When these free electrons are captured, an electric current results that can be used as electricity. Most hydrogen is made from natural gas, but its also possible to get hydrogen by snipping off electrons from plain water.

It sounds so simple. Yet companies trying to commercialize the science have plenty of challenges. We consider the economic differences of all these “atomic” power sources in The Atomics Index..

THE ATOMICS INDEX

September 2014

PHOTOVOLTAIC GROUP

| COMPANY | Country | PUBLIC/ | | OPERATIONS | WEB SITE |
|---------------------------------|--------------|-------------|--|--------------------------------------|---|
| | | PRIVATE | | | |
| 1366 Technologies, Inc. | Private | US | | Solar cell manufacturing equipment | http://www.1366tech.com/ |
| 3S Industries AG | M6YA.F | Switzerland | | Solar module production | http://www.3-s.ch/en/ |
| Advanced Energy Industries | AEIS | US | | Industrial power conversion devices | http://www.advancedenergy.com/ |
| Aleo Solar GmbH | AS1: F | Germany | | Solar power system installation | http://www.aleo-solar.com/usa/ |
| Alta Devices (Hanergy) | Private | US | | Thin film mobile power technology | http://www.altadevices.com/ |
| Amtech Systems, Inc. | ASYS | US | | Furnace systems for PV manufacturing | http://www.amtechsystems.com/ |
| Ascent Solar Technologies, Inc. | ASTI | US | | Flexible PV modules | http://www.ascentsolar.com/ |
| BioSolar | BSRC | US | | Bio-based materials for solar | http://www.biosolar.com/ |
| Bridgeluxe, Inc. | Private | US | | LED manufacturer | http://bridgelux.com/ |
| Camco Clean Energy Plc | CAO.L | UK | | Renewable power producer | http://www.camcocleanenergy.com/ |
| Canadian Solar, Inc. | CSIQ | Canada | | PV cell manufacturing | http://www.canadiansolar.com/ |
| Carmanah Technologies Corp. | CMH.TO | Canada | | Solar LED lighting, panels | http://carmanah.com/ |
| CentroSolar | C3O.DE | Germany | | Solar cell, panel production | http://www.centrosolaramerica.com/ |
| Centrotherm Photovoltaics, AG | | Germany | | Photovoltaic manufacturing | http://www.centrotherm-pv.com/ |
| China Sunergy Co., Ltd | CSUN | China | | Solar cell production | http://www.chinasunergy.com/ |
| Chromasun, Inc. | Private | Australia | | High temperature solar panels | http://chromasun.com/ |
| Conergy AG | CGYK: DE | Germany | | Solar power solutions | http://www.conergy.com/ |
| DayStar Technologies, Inc. | DSTI | US | | PV cell technologies | http://www.daystartech.com/ |
| Dyesol | DYE.AX | Australia | | Dye solar cell development | http://www.dyesol.com/ |
| eiQ Energy | Private | US | | Solar power solutions | http://www.eiqenergy.com/ |
| EMCORE Corp. | EMKR | US | | PV cell manufacturing | http://www.emcore.com/ |
| Envision Solar International | EVSI | US | | Solar systems integration services | http://envisionsolar.com/ |
| E-TON Solar Tech Co. Ltd. | 3452.TWO | China | | Solar cell, panel production | http://www.e-ton solar.com/ |
| Evena SA (EBX Group) | MPXE3:Brazil | Brazil | | Solar power generation | http://www.eneva.com.br/en/ |
| Evergreen Solar, Inc. | Private | China | | Solar panel manufacturing | http://evergreensolar.com/en/ |
| First Solar, Inc. | FSLR | US | | Solar module manufacturing | http://www.firstsolar.com/en/ |
| FLS Energy, Inc. | Private | US | | Solar system integration | http://www.flsenergy.com/ |
| Go Solar USA, Inc. | GSLO | US | | Solar solutions integration services | http://www.gosolarusainc.com/ |
| Grupotec | Private | Spain | | Power generation, solutions | http://www.grupotec.es/en/ |
| GT Advanced Technologies | GTAT | US | | Polysilicon production technology | http://www.gtsolar.com/ |
| Hanwau Q-Cells SE | Private | Germany | | Silicon-based solar cells production | http://www.q-cells.com/en/ |
| Hanwha Solarone Co. Ltd. | HSOL | China | | PV cells and modules manufacturing | http://www.hanwha-solarone.com/ |
| IndoSolar Ltd. | INDOSOLAR | India | | Solar modules | http://www.indosolar.co.in/ |
| JA Solar Holdings Co., Ltd. | JASO | China | | Solar cell manufacturing | http://www.jasolar.com/ |
| Jinko Solar Holding Co., Ltd. | JKS | China | | Silicon wafers, solar cells, modules | http://www.jinkosolar.com/ |
| Juwi Holding AG | Private | Germany | | Solar power generation | http://www.juwi.com/ |
| Kyocera Corp. | KYO | Japan | | Industrial, solar materials | http://global.kyocera.com/ |
| LDK Solar Co., Ltd. | LDK | China | | Solar module manufacturing | http://www.ldksolar.com/ |
| Martifer Solar | MARTI.LS | Portugal | | Solar power generation | http://www.martifersolar.com/ |
| Motech Industries | 6244.TWO | Taiwan | | Solar cells, modules, inverters | http://www.motechsolar.com/en/ |
| NanoSolar, Inc. | Private | US | | Thin-film solar cells, panels | http://www.nanosolar.com/ |

Stock symbols when provided are assumed to be U.S. exchanges unless otherwise indicated.

PHOTOVOLTAIC GROUP - continued:

| COMPANY | Country | PUBLIC/ | | OPERATIONS | WEB SITE |
|---------------------------------|------------|-------------|--|--|---|
| | | PRIVATE | | | |
| New Energies Technologies | NENE | US | | Solar power generation | http://newenergytechnologiesinc.com/ |
| OC Oerlikon Corp., AG | OERL: S | Switzerland | | Thin film silicon solar modules | http://www.oerlikon.com/ |
| OCI Solar Power | Private | US | | Solar power generation | http://www.ocsolarpower.com/ |
| Panasonic (Sanyo Solar) | PCRFY | Japan | | Solar cell manufacturing | http://panasonic.net/sanyo/ |
| Phoenix Solar AG | PS4.DE | Germany | | PV system integrator | http://www.phoenixsolar-group.com/ |
| PowerFilm, Inc. | PFLM.L | UK | | Thin, flexible solar panels | http://www.powerfilmsolar.com/ |
| Prem. Power Renew. Energy | PPRW | US | | Solar power systems integration | http://www.premierpower.com/ |
| PV Crystalox Solar Plc | PVCS.L | UK | | Silicon ingot production | http://www.pvcystalox.com/home/ |
| RALOS New Energy GmbH | BGH: BE | Germany | | Solar, LED systems integration | http://www.ralos.de/ |
| Real Goods Solar, Inc. | RSOL | US | | Solar energy integration services | http://www.realgoodssolar.com/ |
| Renesola Ltd. | SOL | China | | Solar wafers and power products | http://www.renesola.com/ |
| Renewable Energy Corp. | REC: OSLO | Norway | | Solar panel supply | http://www.recgroup.com/ |
| Roth & Rau AG | R8R.De | Germany | | Plasma and ion beam technology | http://www.roth-rau.de/ |
| Saferay Holding GmbH | Private | Germany | | Independent solar power generation | http://www.saferay.com/index.php |
| SAG SolarStrom | SAG.DE | Germany | | Turn key solar systems | http://www.solarstromag.com/en/ |
| Solairedirect | Private | France | | Solar park development | http://www.solairedirect.com/ |
| Solar Fabrik, AG | SFX.DE | Germany | | Solar module manufacturing | http://www.solar-fabrik.de/home/ |
| Solar World AG | SWVG: DE | Germany | | Solar power kits, integration | http://www.solarworld.de/ |
| SolarCity Corp. | SCTY | US | | Solar power systems integration | http://www.solarcity.com/ |
| Solaria Energia, SA | AOR: BE | Spain | | Solar systems integration | http://www.solariaenergia.com/ |
| Solon SE | SOO1: GR | Germany | | Solar module manufacturing | http://www.solon.com/cw/en/ |
| Solray Energy | Private | Canada | | Solar power generation | http://solray.ca/ |
| Spire Corp. | SPIR | US | | Turnkey solar solutions | http://www.spirecorp.com/ |
| STR Holdings, Inc. | STRI | US | | Solar module encapsulant | http://www.strholdings.com/ |
| SunEdison, Inc. | SUNE | US | | Solar wafer manufacturing | http://www.memc.com/ |
| Suniva, Inc. | Private | US | | Solar cell manufacturing | http://www.suniva.com/ |
| Sunpower Corp. | SPWR | US | | Solar electric power technologies | http://www.sunpowercorp.com/ |
| SunTech Power Holdings | STP | China | | PV manufacturing, engineering services | http://www.suntech-power.com/ |
| Sunways AG | SWW.DE | Germany | | Solar energy storage solutions | http://www.sunways.eu/en/ |
| Surana Ventures Ltd. | SURANAVEL | India | | Solar modules | http://www.suranaventures.com/ |
| Systaic AG | SJK.DE | Germany | | Solar power systems | http://www.systaic.com/ |
| Trina Solar Ltd. | TSL | China | | Integrated solar power products | http://www.trinasolar.com/ |
| Trony Solar Holdings | TRO | China | | Solar cell, module manufacturing | http://www.trony.com/ |
| Veeco Instruments | VECO | US | | Solar, LED lighting technologies | http://www.veeco.com/ |
| Wacker Chemie AG | WCH.DE | Germany | | Solar cell materials supply | http://www.wacker.com/ |
| WebSol Energy Systems Ltd. | WEBSOL.BOM | Germany | | Photovoltaic monocrystallines | http://www.webelsolar.com/ |
| Westinghouse Solar | Private | US | | Solar power system installation | http://www.westinghousesolar.com/ |
| XsunX, Inc. | XSNX | US | | Thin film solar development | http://www.xsunx.com/ |
| Yingli Green Energy Holding Co. | YGE | China | | Solar cell manufacturing | http://www.yinglisolar.com/ |

Stock symbols when provided are assumed to be U.S. exchanges unless otherwise indicated.

NUCLEAR GROUP

| COMPANY | Country | PUBLIC/ PRIVATE | OPERATIONS | WEB SITE |
|----------------------------|---------|--------------------|------------------------------------|---|
| Areva, SA | ARVCF | France | Nuclear power plant design | http://www.areva.com/ |
| Chicago Bridge & Iron | CBI | US | Nuclear power plant construction | http://www.cbi.com/ |
| DTE Energy Corp. | DTE | US | Electric utility, NuStart member | http://www.dteenergy.com/ |
| Duke Energy Corp. | DUK | US | Electric utility, NuStart member | http://www.duke-energy.com/ |
| Electricite de France SA | EDF: PA | France | Electric utility, NuStart member | http://www.edf.com/ |
| Entergy Corp. | ETR | US | Electric utility, NuStart member | http://www.entergy.com/ |
| Exelon Corp. | EXC | US | Electric utility, NuStart member | http://www.exeloncorp.com/ |
| Flibe Energy, LLC | Private | US | Nuclear reactor design, production | http://flibe-energy.com/ |
| General Atomics | Private | US | Nuclear fusion development | http://www.ga.com/index.php |
| Lightbridge Corp. | LTBR | US | Nuclear energy consulting services | http://www.ltbridge.com/ |
| NAC Worldwide Consulting | Private | US | Nuclear fuel cycle consulting | http://www.nacworldwide.com/ |
| NextEra Energy, Inc. | NEE | US | Electric utility, NuStart member | http://www.nexteraenergy.com/ |
| Nuclear Energy Consultants | Private | US | Nuclear power plant design | http://www.necenergy.com/ |
| NuScale Power, Inc. | Private | US | Nuclear power plant design | http://www.nuscalepower.com/ |
| SCANA Corp. | SCG | US | Electric utility, NuStart member | http://www.scana.com/en |
| Southern Company | SO | US | Electric utility, NuStart member | http://www.southerncompany.com/ |
| Transatomic Power, Inc. | Private | US | Nuclear reactor design, licensing | http://transatomicpower.com/ |
| USEC, Inc. | USU | US | Low enriched uranium supplier | http://www.usec.com/ |
| Westinghouse Electric Co. | Private | US | Nuclear power plant design | http://www.westinghouse.com/ |

Stock symbols when provided are assumed to be U.S. exchanges unless otherwise indicated.

HYDROGEN GROUP

| COMPANY | Country | PUBLIC/ PRIVATE | OPERATIONS | WEB SITE |
|-------------------------|----------------|----------------------------|---|---|
| DoppStein Enterprises | Private | US | Water electrolysis technology | http://www.doppstein.com/ |
| Hydrogenics, Inc. | HYGS | Canada | Hydrogen generation, water electrolysis | http://www.hydrogenics.com/ |
| HydroGreen Energy, Inc. | Private | US | Hydro power turbines, electrolysis | http://www.hgenergy.com/ |

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