



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

January 2018

PHOTOVOLTAIC GROUP

COMPANY	Country	PUBLIC/		OPERATIONS	WEB SITE
		PRIVATE			
1366 Technologies, Inc.	Private	US		Solar cell manufacturing equipment	http://www.1366tech.com/
Advanced Energy Industries, Inc.	AEIS	US		Industrial power conversion devices	http://www.advancedenergy.com/
Aleo Solar GmbH	Private	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/
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	Private	Germany		Solar cell, panel production	http://www.centrosolaramerica.com/
Centrotherm Photovoltaics, AG	CTNK.F	Germany		Photovoltaic manufacturing	http://www.centrotherm-pv.com/home/
China Sunergy Co., Ltd	CSUNY	China		Solar cell production	http://www.chinasunergy.com/
Chromasun, Inc.	Private	Australia		High temperature solar panels	http://chromasun.com/
Conergy AG	Private	Germany		Solar power solutions	http://www.conergy.com/
Cypress Creek Renewables	Private	US		Solar system integration	https://ccrenew.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, Inc.	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-tonsolar.com/
First Solar, Inc.	FSLR	US		Solar module manufacturing	http://www.firstsolar.com/en/index.php
Go Solar USA, Inc.	GSLO	US		Solar solutions integration services	http://www.gosolarusainc.com/
GreatCell Solar Ltd.	GSL.AX	Australia		Dye solar cell development	http://www.dyesol.com/
Grupotec	Private	UK		Power generation	http://www.grupotec.es/en/home.html
GT Advanced Technologies	Private	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.	QCLSF	Germany		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/homepage.html
Kyocera Corp.	KYO	Japan		Industrial, solar materials	http://global.kyocera.com/
LDK Solar Co., Ltd.	LDKYQ	China		Solar module manufacturing	http://www.ldksolar.com/
Martifer Solar (Volitalia)	VLTA.PA	France		Solar power generation	http://www.martifersolar.com/
Meyer Burger Technology AG	M6YA.F	Switzerland		Solar module production	http://www.3-s.ch/en/
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/
OC Oerlikon Corp. AG	OERL: SW	Switzerland		Thin film silicon solar modules	http://www.oerlikon.com/
OCI Solar Power	Private	US		Solar power generation	http://www.ocsolarpower.com/index.html
Panasonic (Sanyo Solar)	PCRFY	Japan		Solar cell manufacturing	http://panasonic.net/sanyo/

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

PHOTOVOLTAIC GROUP - continued:

COMPANY	Country	PUBLIC/		OPERATIONS	WEB SITE
		PRIVATE			
Phoenix Solar AG	PS4.DE	Germany		PV system integrator	http://www.phoenixsolar-group.com/en.html
PowerFilm, Inc.	Private	UK		Thin, flexible solar panels	http://www.powerfilmsolar.com/about/
Premium Power Renewable Energy	PPRW	US		Solar power systems integration	http://www.premierpower.com/
Prism Solar Technologies	Private	US		Bifacial solar modules	https://www.prismsolar.com/
PV Crystalox Solar Plc	PVCS.L	UK		Silicon ingot production	http://www.pvcrytalox.com/home/
RALOS New Energy GmbH	Private	Germany		Solar, LED systems integration	http://www.ralos.de/
Real Goods Solar, Inc.	RGSE	US		Solar energy integration services	http://www.realgoodssolar.com/
REC Silicon ASA	REC: OL	Norway		Solar panel supply	http://www.recgroup.com/
Renesola Ltd.	SOL	China		Solar wafers and power products	http://www.renesola.com/
Saferay Holding GmbH	Private	Germany		Independent solar power generation	http://www.saferay.com/index.php
SAG Solar	Private	Germany		Turn key solar systems	http://www.solar.com/en/
Siva Power, Inc.	Private	US		Photovoltaic power modules	https://www.sivapower.com/
Solairedirect	Private	France		Solar park development	http://www.solairedirect.com/
Solar Alliance, Inc.	FNVRF	Canada		Solar power generation	http://www.solaralliance.com/
Solar Fabrik, AG	OFZP.IL	Germany		Solar module manufacturing	http://www.solar-fabrik.de/home/
Solar World AG	SWVG.F	Germany		Solar power kits, integration	http://www.solarworld.de/
Solaria Energia, SA	AOR: MU	Spain		Solar systems integration	http://www.solariaenergia.com/
SolarWindow Technologies	WNDW	US		Solar power windows	http://www.solarwindow.com/
Solon Energy GmbH	SOO1: GR	Germany		Solar module manufacturing	http://www.solon.com/cw/en/
Solray Energy	Private	Canada		Solar ower 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.	SUNEQ	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/
Surana Ventures Ltd.	SURANASOL	India		Solar modules	http://www.suranaventures.com/
Transphorm, Inc.	Private	US		Advanced semiconductors	http://www.transphormusa.com/
Trina Solar Ltd.	Private	China		Intergrated solar power prdocuts	http://www.trinasolar.com/
Trony Solar Holdings	2468.HK	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/
Widetronix, Inc.	Private	US		Ultra low power sensor platforms	http://www.widetronix.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/

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NUCLEAR GROUP

COMPANY	Country	PUBLIC/ PRIVATE	OPERATIONS	WEB SITE
Areva, SA	Private	France	Nuclear power plant design	http://www.areva.com/
Chicago Bridge & Iron	CBI	Netherlands	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.	LEU	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, Inc.	Private	US	Water electrolysis technology	http://www.doppstein.com/
Hydrogenics, Inc.	HYGS	Canada	Hydrogen generation, water electrolysis	http://www.hydrogenics.com/
Hydrogenious Technologies	Private	Germany	Liquid hydrogen development	http://www.hydrogenious.net/en/
HydroGreen Energy, Inc.	Private	US	Hydro power turbines, electrolysis	http://www.hgenenergy.com/
HydroPhi Technologies Group	HPTG	US	Hydrogen development	http://www.hydrophi.com/

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