

InterOperable On-Site Energy by Scott Sklar

The Electrical Subgroup of the Sustainable Manufacturing,
Advanced Research and Technology (SMART) Wind
Consortium and DWEA. Topic: Personal energy driving
personal security, personal transportation, personal
communications and personal networking (internet)

May 26, 2015
Washington, DC



The Stella Group, Ltd.

The Stella Group, Ltd.. is a technology optimization and strategic policy firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, geo-exchange, heat engines, minigeneration (natural gas), microhydropower, modular biomass, photovoltaics, small wind, and solar thermal (including daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). The Stella Group, Ltd. blends distributed energy technologies, aggregates financing (including leasing), with a focus on system standardization. Scott Sklar serves as Steering Committee Chair of the Sustainable Energy Coalition, composed of the DC-based renewable energy and energy efficiency trade associations and analytical groups, and sits on the national Boards of Directors of the non-profit Business Council for Sustainable Energy and The Solar Foundation, and is an Adjunct Professor teaching two interdisciplinary courses at The George Washington University. Chairs DOC RE&EEAC, thru June 2016.

The Stella Group, Ltd. 706 North Ivy Street, Arlington, VA 22201

202-347-2214 (f-2215) www.TheStellaGroupLtd.com solarsklar@aol.com

Analog Motorola DynaTAC 8000X Advanced Mobile Phone System mobile phone
as of 1983 (32 years ago)



If you imagine the first smartphone— like its predecessor the regular cellular phone—to be a monstrous and monochromatic block of plastic, you'd be correct. In 1992 IBM showcased the IBM Simon at the 1992 COMDEX (Computer Dealers' Exhibition); in doing so they introduced the world to the first smart phone and it was just the kind of enormous brick. (23 years ago)





The first cell phone with a built-in camera was manufactured by Samsung and released in South Korea in June of 2000. The SCH-V200 flipped open to reveal a 1.5-inch TFT-LCD, and the built-in digital camera was capable of taking 20 photos at 350,000-pixel resolution, which is 0.35-megapixels, but you had to hook it up to a computer to get your photos. (15 years ago)

Read more: <http://www.digitaltrends.com/mobile/camera-phone-history/#ixzz3P8C1laZH>



Released October 2001, this was the first ever iPod. It could hold between 5-10 GB of music, and Apple achieved its small size by using a 1.8" hard drive while competitors were still using 2.5" ones. (14 years ago)

Samsung SCH-N300 with Verizon – the first commercial A-GPS (2001) For a development as important as mobile network Assisted GPS (A-GPS) Verizon had such a service working with the Samsung SCH-N300 from December 2001 (14 years ago)



CPU Dual-core 1.3 GHz Swift (ARM v7-based)

GPU PowerVR SGX 543MP3 (triple-core graphics)

MEMORY Card slot No

Internal 16/32/64 GB, 1 GB RAM DDR2

CAMERA Primary 8 MP, 3264 x 2448 pixels, autofocus, LED flash, check quality

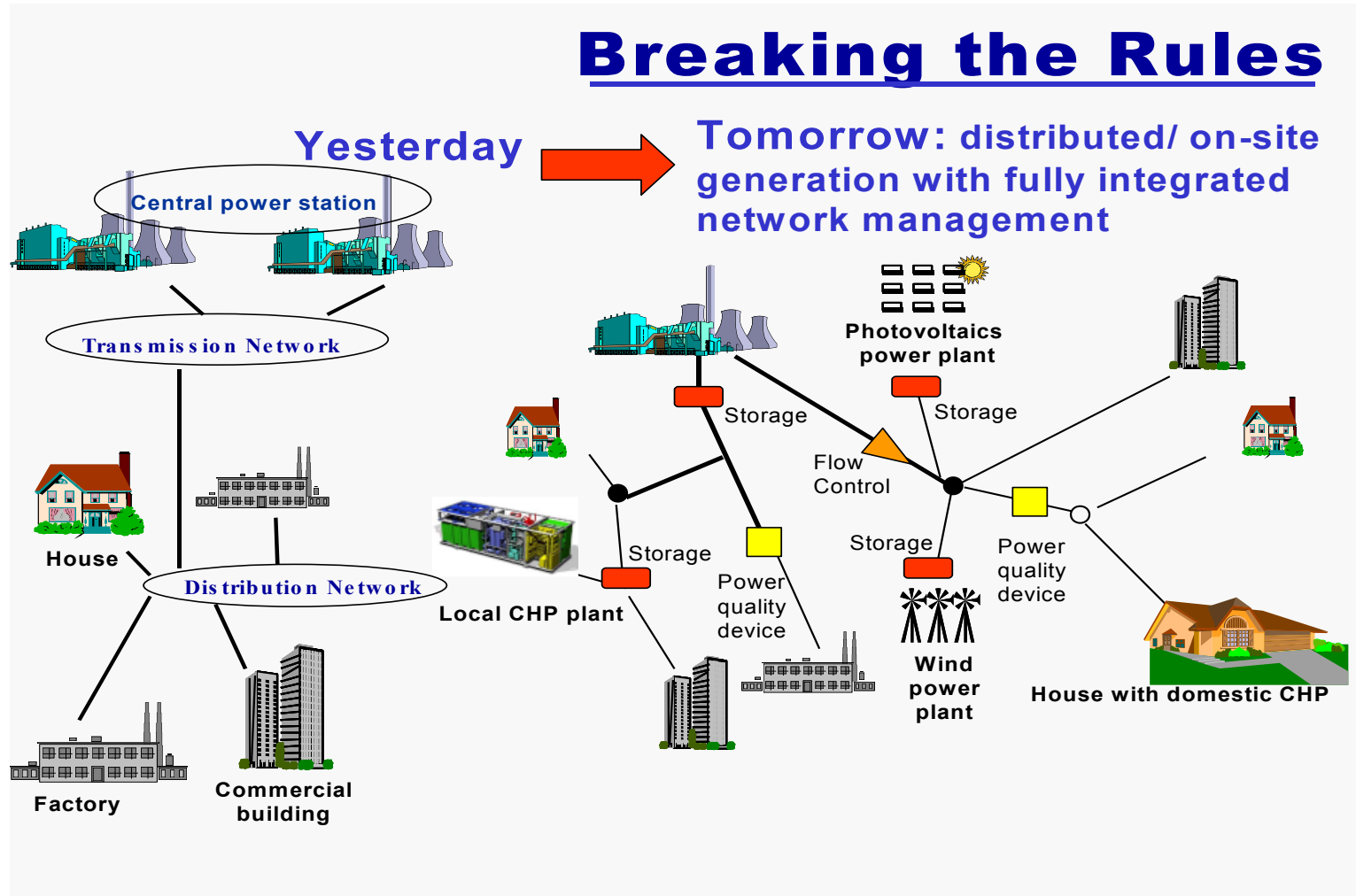
Features 1/3.2" sensor size, 1.4 μ m pixel size, simultaneous HD video and image recording, touch focus, geo-tagging, face detection, panorama, HDR photo

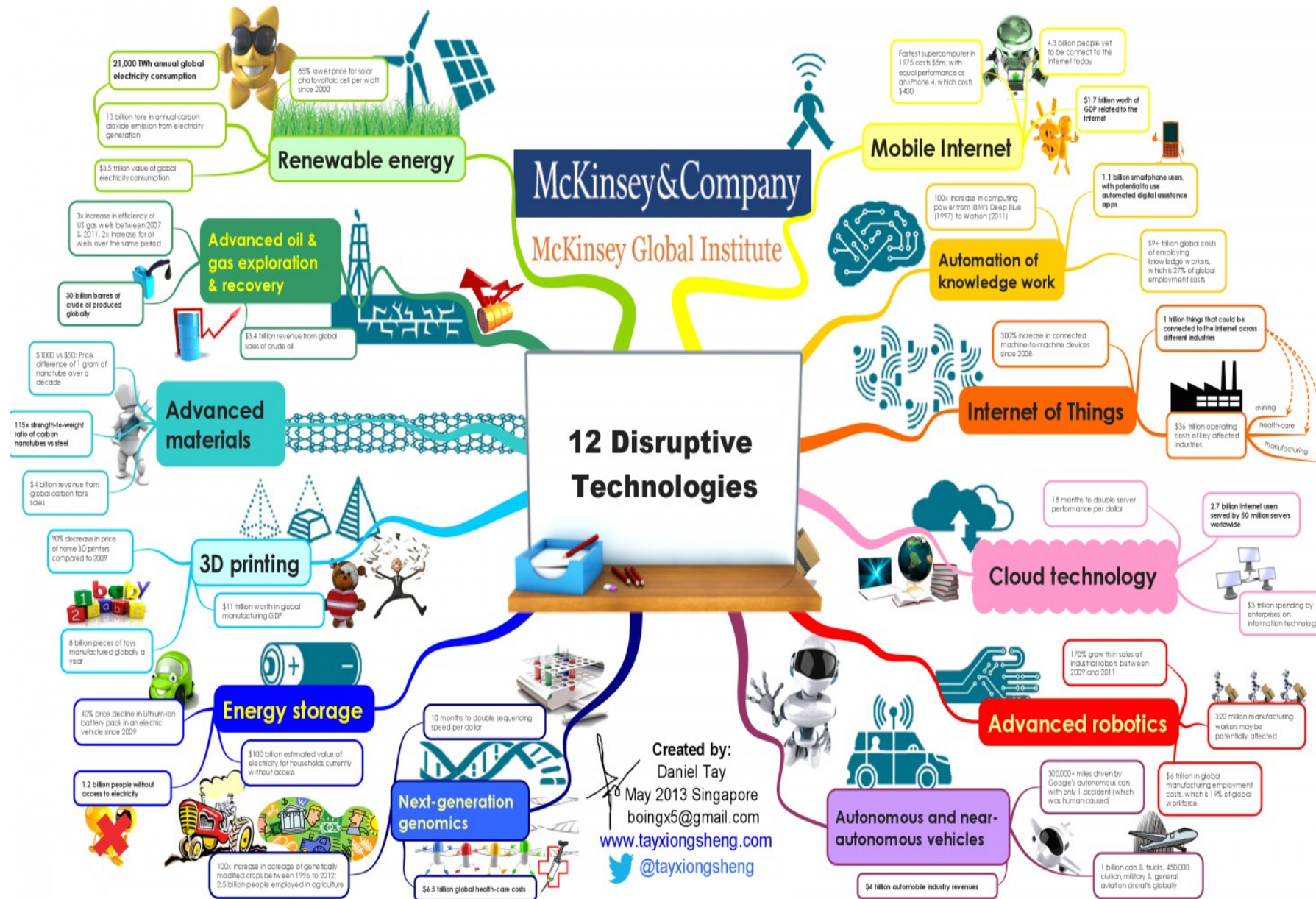
Video 1080p@30fps, check quality, GPS. iTunes.

Secondary 1.2 MP, 720p@30fps, face detection, FaceTime over Wi-Fi or Cellular

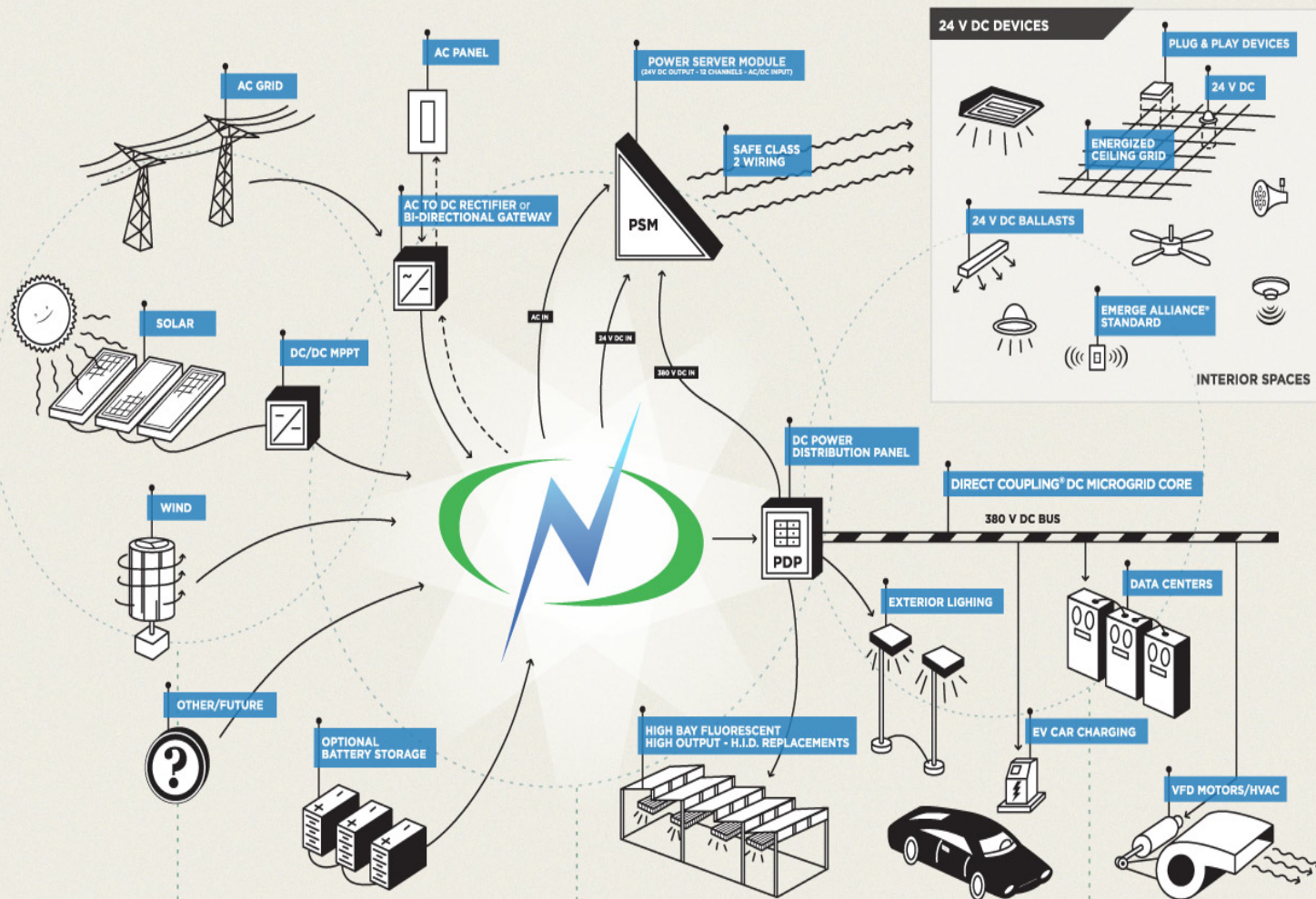


The Electric Grid: New Approaches





HOW DOES A DC MICROGRID WORK?



POWER SOURCES

Alternative energy, battery, or AC Grid send power to transformers and PSM's.



UNIFIED DC POWER

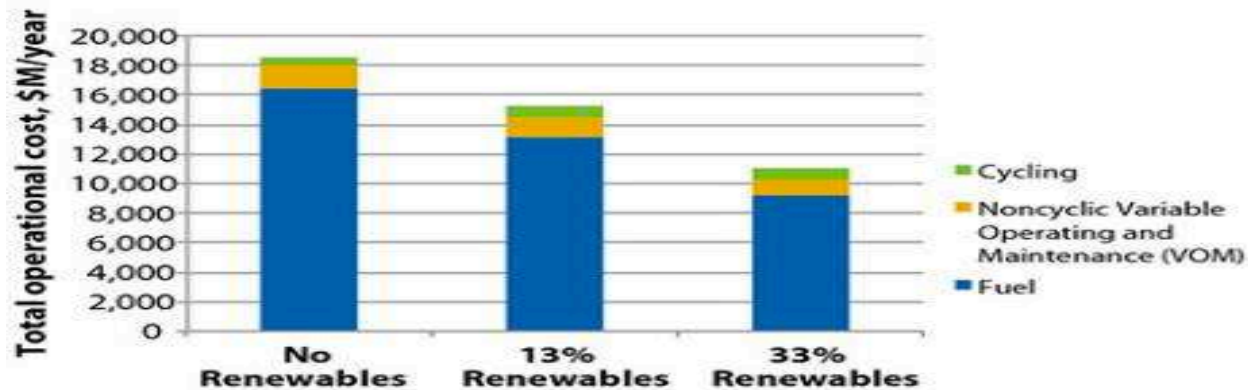
Engineered by Nextek Power Systems, power is sent to the microgrid for distribution.



DC MICROGRID CORE

Managed DC power is distributed to appliances like lighting, HVAC, EV charging stations, etc.

Cycling Costs from a System Perspective



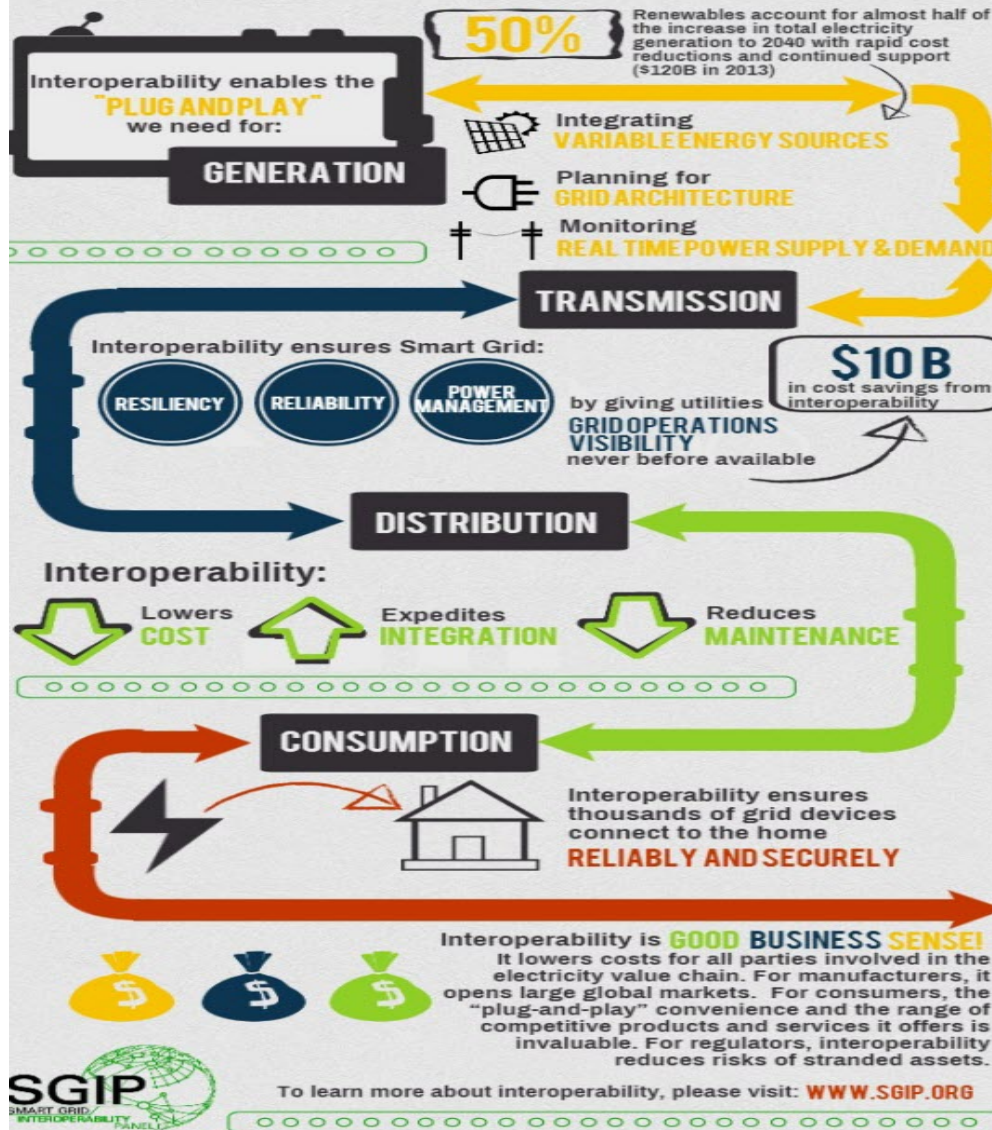
*High wind and solar scenarios. Capital costs are not reflected.

The overall reductions in emissions that would be caused by higher levels wind and [solar electricity](#). [The study finds that the high wind and solar scenarios \(33 percent of electric generation\) reduce carbon dioxide emissions by 29 percent to 34 percent across the Western Interconnection, which ranges from the Western tip of Texas to California and up into the Canadian provinces of British Columbia and Alberta. While sulfur dioxide emissions were higher than expected because of cycling, the study still found that overall emissions were reduced by 14 percent to 24 percent in the high scenarios. Nitrogen oxides \(NOx\) are reduced more than expected by cycling — between 16 percent to 22 percent in the high scenarios. “This is because the average coal plant in the West has a lower NOx emissions rate at partial output than at full output,” NREL says.](#)

INTEROPERABILITY 101

(AND WHY IT'S GOOD BUSINESS SENSE FOR THE SMART GRID)

Maintaining a reliable Smart Grid is a daunting task. Interoperability – the driving force for integrating new components into the grid – is a necessity. From Generation to Consumption, interconnected objects must be able to work together to enable effective, resilient and secure electricity.



Sources:
http://www.iea.org/publications/freepublications/publication/WEO_2014_ES_English_WEB.pdf
http://www.gridwiseac.org/pdfs/financial_interoperability.pdf

**Small Solar Surging - 13% Of New U.S. Power Plant Capacity in 2014:
Institute for Local Self-Reliance, by John Farrell, March 16th, 2015**

<http://ilsr.org/small-scale-solar-contributes-13-power-plants-2014>

Small-scale solar, on residential and non-residential rooftops (and property) projects, a megawatt or smaller, contributed 13% of new power plant capacity in 2014, a new record. This continues a trend toward renewable energy, generally, and toward distributed renewable energy. The sustained growth of small scale solar brings a sharper focus on the \$48 billion opportunity for U.S. electricity customers in energy efficiency and distributed renewable energy development. The opportunity may only grow. The Solar Energy Industries Association estimates that residential solar alone will represent 45% of the solar market from 2017-2020. Combined with non-residential small-scale solar, distributed solar is expected to be nearly 75% of the solar market.

STELLA GROUP VA Office



PV ROOFING SHINGLES, SMALL WIND, HYDROGEN FUEL CELL,
SUPER-INSULATING WINDOWS

Standardized Interconnections

- 42 States allow DG under IEEE consensus standards which has allowed smart battery banks like to enter the market
- This standardized unit, has deep-cycle AGM batteries in bottom half, and charge controller, inverter, quick disconnect, & microprocessor with modem in top half
- The battery bank is web-enabled with performance-based software with color-coded icons



HOME SECURITY & AUTOMATION

- [What Google Really Gets Out of Buying Nest for \\$3.2 Billion ...www.wired.com/.../googles-3-billion-nest-buy-finally-make-intern.](http://www.wired.com/.../googles-3-billion-nest-buy-finally-make-intern.)



Nest Learning Thermostat
2nd Generation

Century College

White Bear Lake, MN



Wind and Battery Monitoring

- Battery Monitor
- Wind and Solar Monitor



Samlex BW01



Outback MATE3

WIFI Internet

- Laptop - Tablets
- Web router



Building Security & Wireless Cams

- ADT Home Security
- Video Monitoring Webcam



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- Mobile Alerts
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All images are for illustration purposes only.

INCLUDES A WIRELESS CAMERA INSTALLED *FREE**

\$0
INSTALLATION COST*



Internet Telephones

- [UniData Incom ICW-1000G](#)
[WiFi Phone](#)



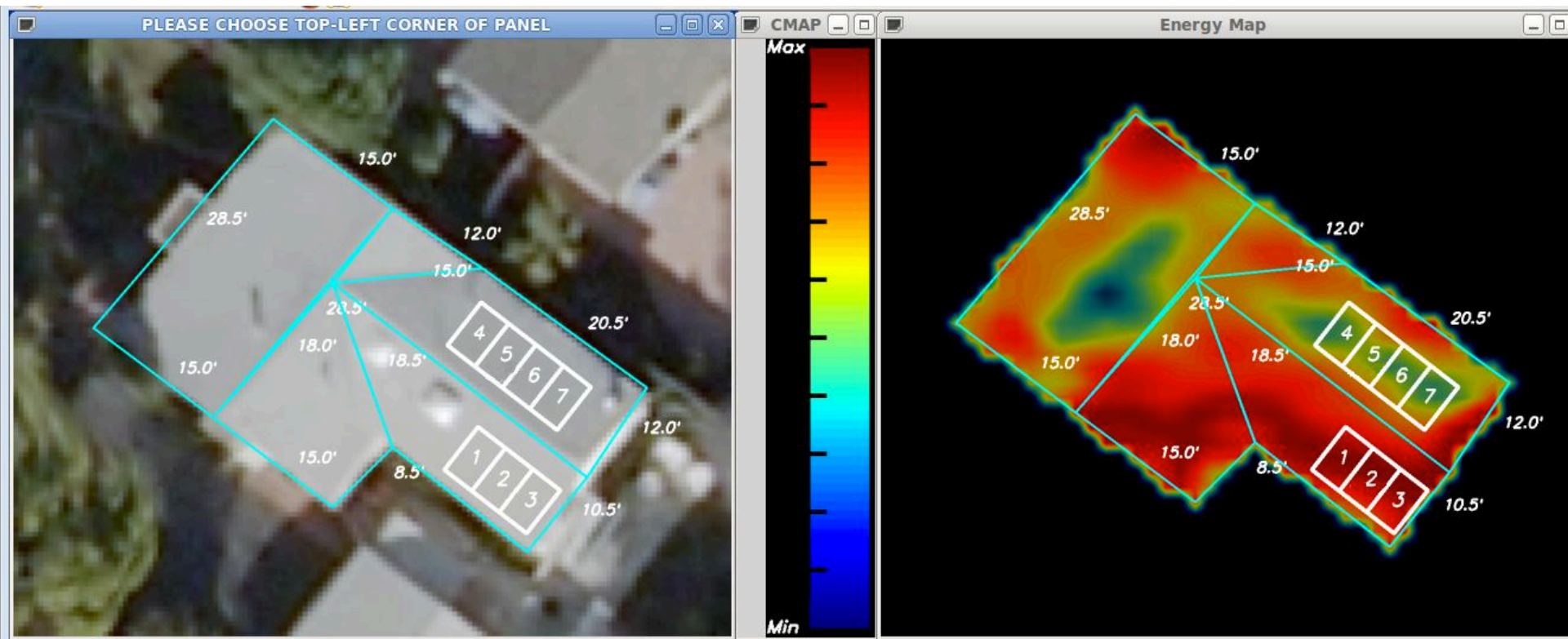
Allworx 6X VoIP Network Server
and Phone System 8200004



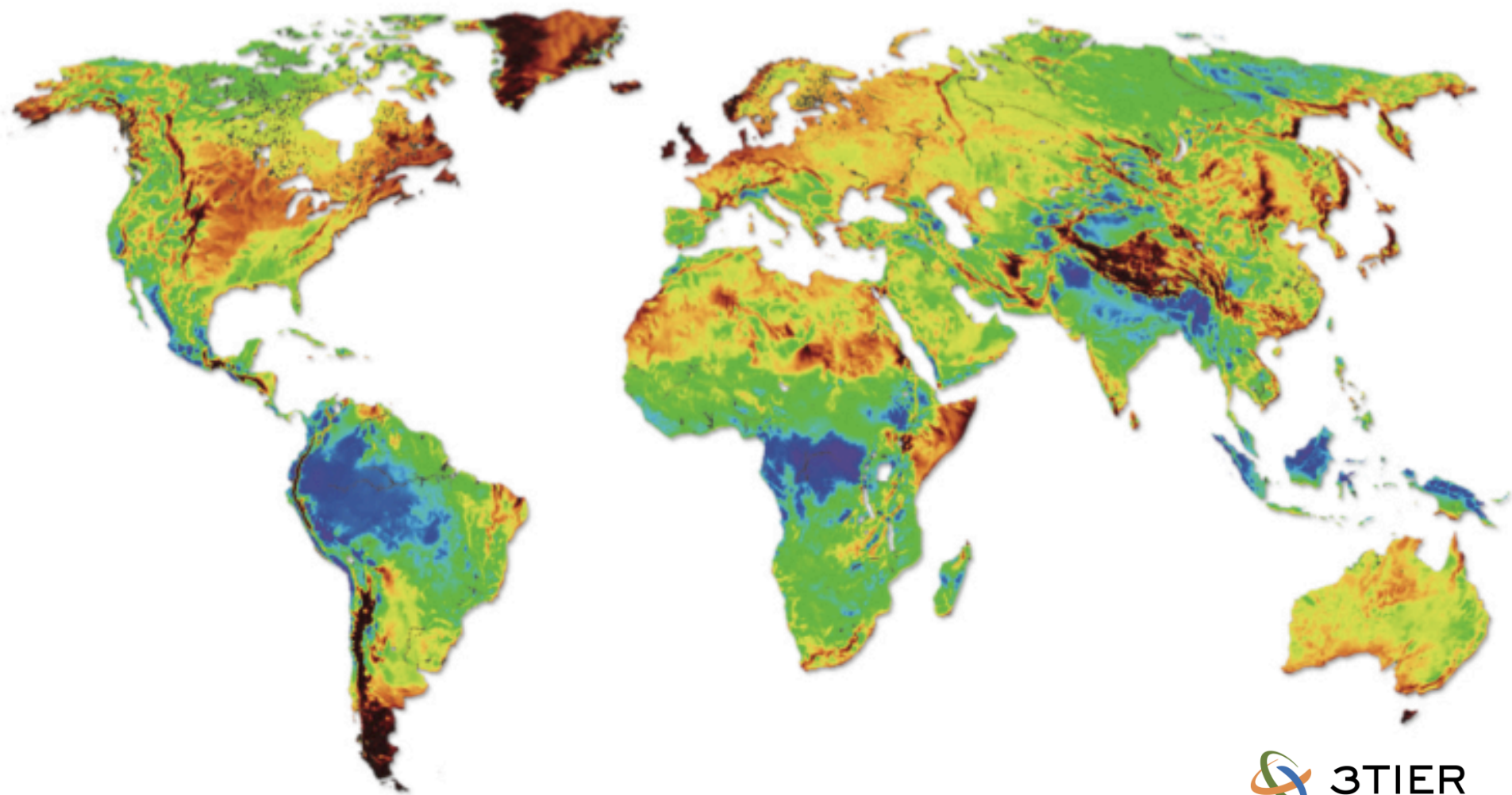
ELECTRIC BICYCLES

- Triple crown front suspension and 26" tires make for smooth cruising Lightweight Lithium batteries Easy, clean 7-speed shifting Standard heavy duty kickstand, rack and light
Lightweight build gets 28 miles on a single charge, double that if pedal assisted





Solar Energy Siting Software
www.solar-red.net



DRIVERS OF ON-SITE DG

- Grid resiliency
- Trend towards user control & choice
- Need for higher electric power quality
- On-site power reliability
- Low water use
- CAA compliance
- Predictability thru use control
- Capital flows from huge grids to segmented grids

PV DEMO VAN

- SANYO HIT PV
- MARLEC WIND TURBINE
- AXION DEEP CYCLE BATTERIES
- RELI-ON FUEL CELL
- EXELTEK INVERTER

POWERS DVD PLAYER
& OUTSIDE ALL-
WEATHER VIDEO
SCREEN



