Managing Energy for Sustained Savings

A Company Perspective

IPEEC Energy Management Action networK

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May 10 2010

Schneider Electric

1st …..Schneider Electric at a glance

15.8
Billion global sales in 2009 (in €)
34% of sales in new economies
x2 compared to 2004

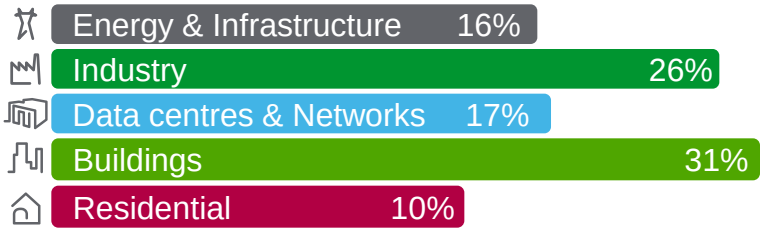
100000+
people in 100+ countries

5%
Sales devoted to R&D

US our largest Business
50+ factories,
12000+ employees

The global specialist in Energy management

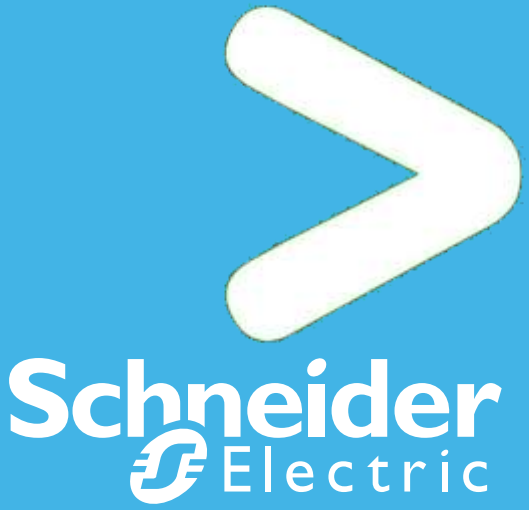
Sales by End markets – 2008



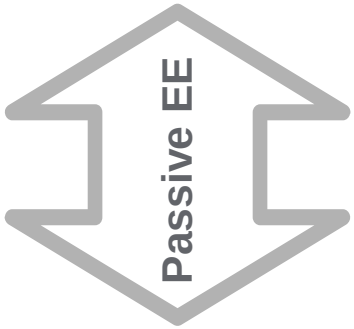
A Recognised Sustainable commitment

Managing Energy Use

Two key strategic perspectives



30% savings are available today…



- Efficient devices and efficient installation (10 to 15 %)

Low consumption devices, insulated building…

- Optimized usage of installation and devices (5 to 15%)

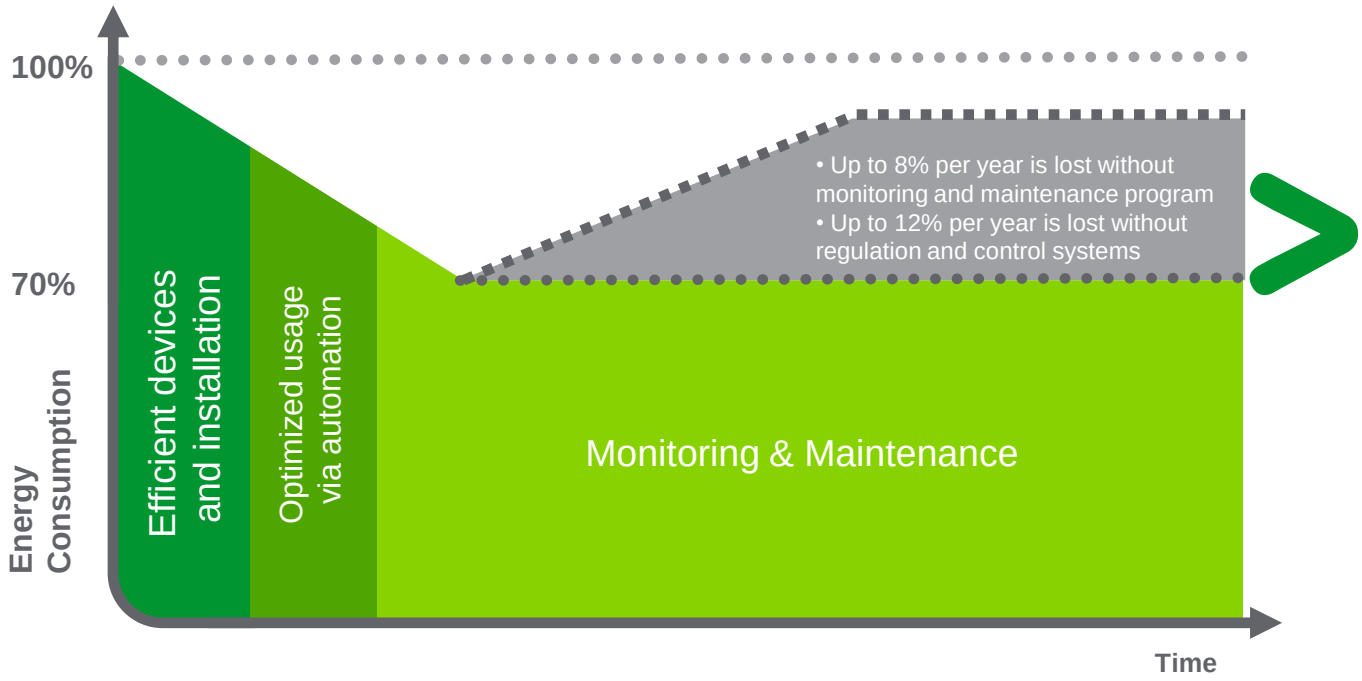
Turn off devices when not needed, regulate motors or heating at the optimized level…

- Permanent monitoring and improvement program (2 to 8%)

Rigorous maintenance program, measure and react in case of deviation

But..... The long term challenge is sustained energy savings

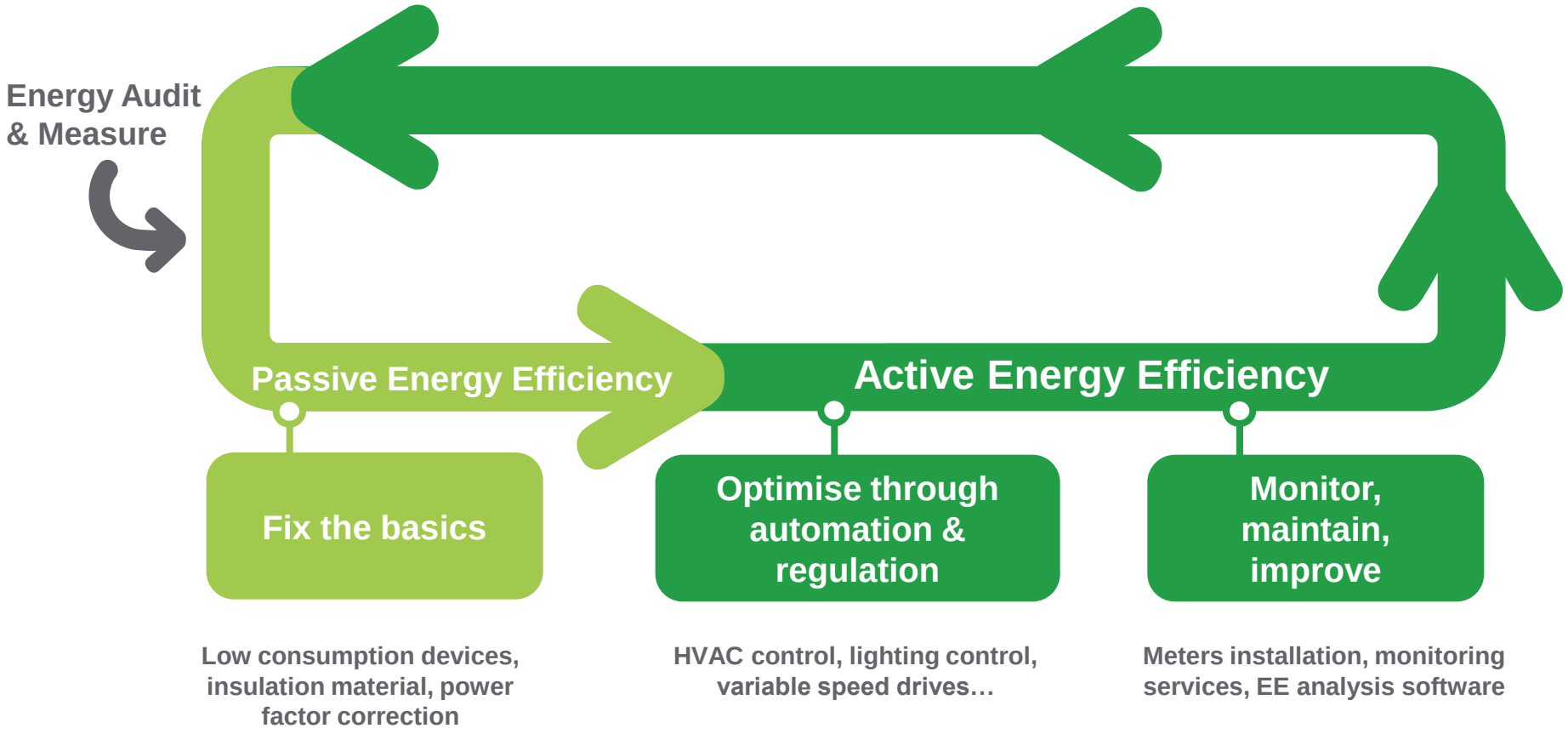
- One step is not enough, savings are lost due to
  - Behavior & Commitment
  - Lack of visibility
  - Lack of Automation



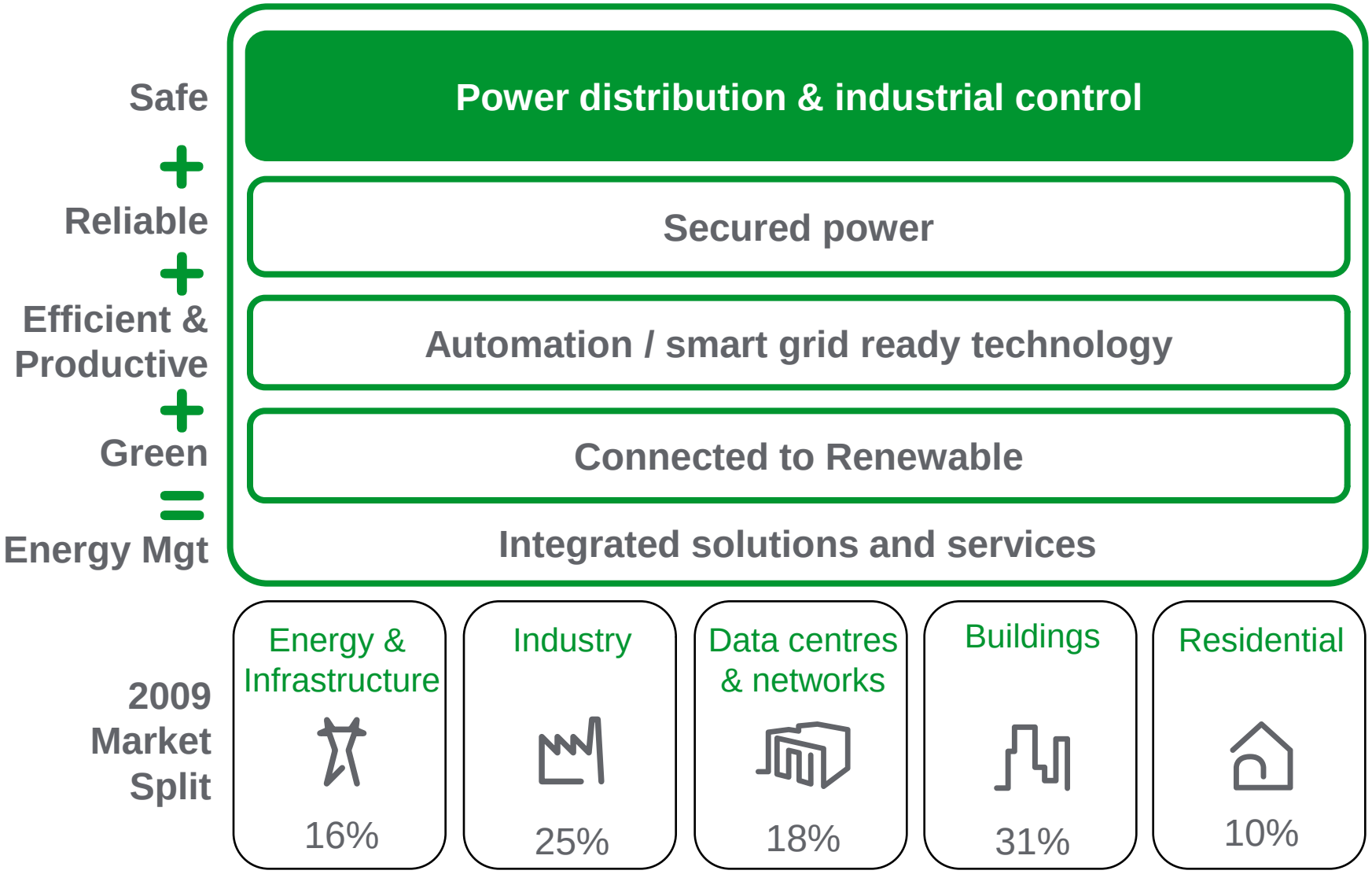
Control and monitoring technologies will sustain the savings

And the Keys to Sustained Energy Savings are……

A Lifecycle Approach & Active Energy Efficiency



A new power equation to solve



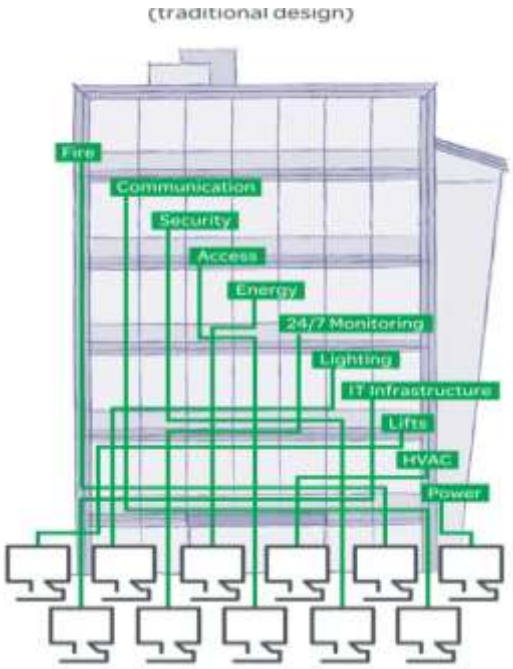
New Opportunity from technology and markets

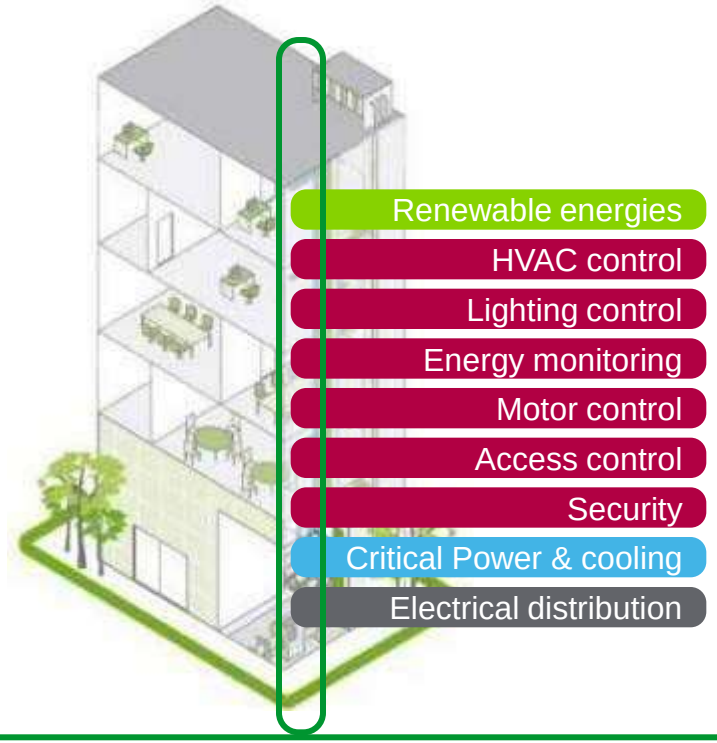
- The intersection of IT and Energy Management will create new opportunities to accelerate energy efficiency

“Energy is invisible.

We need to make it visible.”

From multi-silo to single backbone system: example of buildings





Simple Integration Interoperability and openness to third party systems

EcoStruxure

Reliability
- Continuity of service of Electrical Power

Efficiency
- 30% energy savings
- Optimized Capex & Opex

Productivity
- Productive work places

Green
- Connection to renewable energies

What is Possible

Walking the Talk

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Program Set a Corporate Goal of 4% Energy Reduction per Year

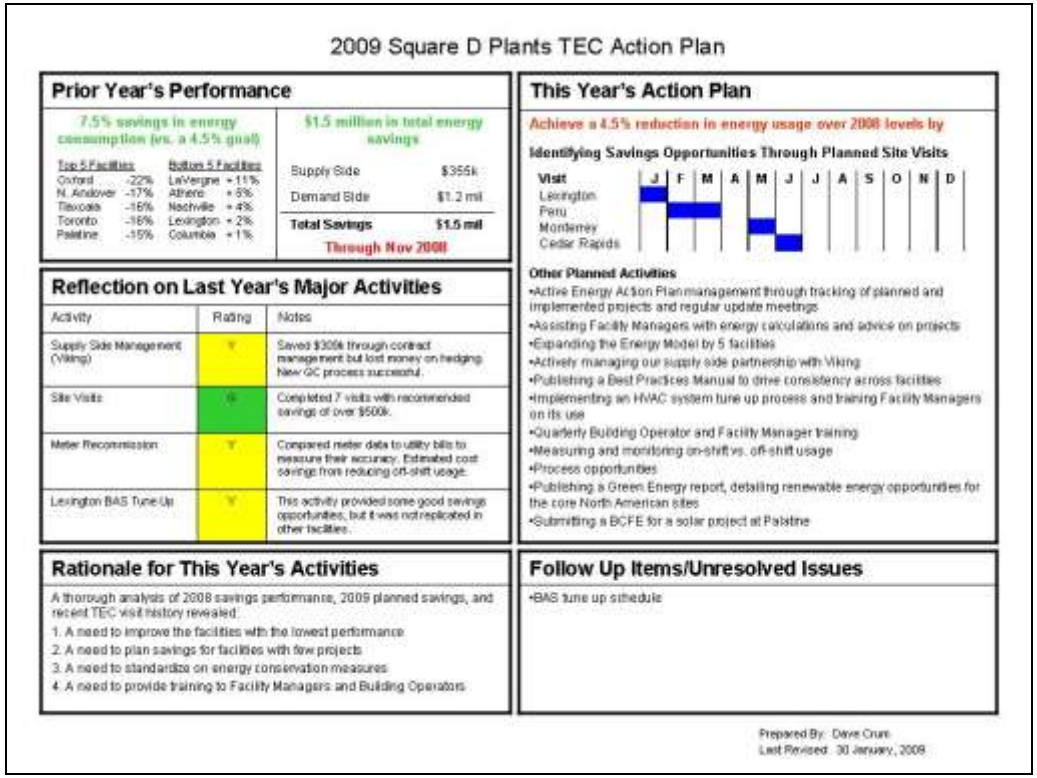
Started with 18 US Facilities in 2005 expanded to 51 sites as of 2009

- 400 Opportunities Identified
- 8% Reduction in 2009 (normalized)
- 10% Reduction in GHG each of the last two years

- Energy Action Plan at each Facility.
- Quarterly Reviews and Annual Assessments

Annual Planning Process

An opportunity to review prior year actions and performance in order to set goals and lay out activities to ensure future success



2009 Square D Plants TEC Action Plan

Prior Year's Performance

7.5% savings in energy consumption (vs. a 4.5% goal)

Top 5 Facilities		Bottom 5 Facilities	
Oxford	-22%	LeVergne	+11%
N. Andover	-17%	Athens	+5%
Tlaxcala	-16%	Nashville	+4%
Toronto	-16%	Lexington	+2%
Palatine	-15%	Columbia	+1%

$1.5 million in total energy savings

Supply Side	$355k
Demand Side	$1.2 mil
Total Savings	**$1.5 mil**

Through Nov 2008

This Year's Action Plan

Achieve a 4.5% reduction in energy usage over 2008 levels by

Identifying Savings Opportunities Through Planned Site Visits

Visit	J	F	M	A	M	J	J	A	S	O	N	D
Lexington												
Peru												
Monterrey												
Cedar Rapids												

Other Planned Activities

- Active Energy Action Plan management through tracking of planned and implemented projects and regular update meetings
- Assisting Facility Managers with energy calculations and advice on projects
- Expanding the Energy Model by 5 facilities
- Actively managing our supply side partnership with Viking
- Publishing a Best Practices Manual to drive consistency across facilities
- Implementing an HVAC system tune up process and training Facility Managers on its use
- Quarterly Building Operator and Facility Manager training
- Measuring and monitoring on-shift vs. off-shift usage
- Process opportunities
- Publishing a Green Energy report, detailing renewable energy opportunities for the core North American sites
- Submitting a BCFE for a solar project at Palatine

Reflection on Last Year's Major Activities

Activity	Rating	Notes
Supply Side Management (Viking)	Y	Saved $300k through contract management but lost money on hedging. New GC process successful.
Site Visits	G	Completed 7 visits with recommended savings of over $500k.
Meter Recommission	Y	Compared meter data to utility bills to measure their accuracy. Estimated cost savings from reducing off-shift usage.
Lexington BAS Tune Up	Y	This activity provided some good savings opportunities, but it was not replicated in other facilities.

Rationale for This Year's Activities

A thorough analysis of 2008 savings performance, 2009 planned savings, and recent TEC visit history revealed:

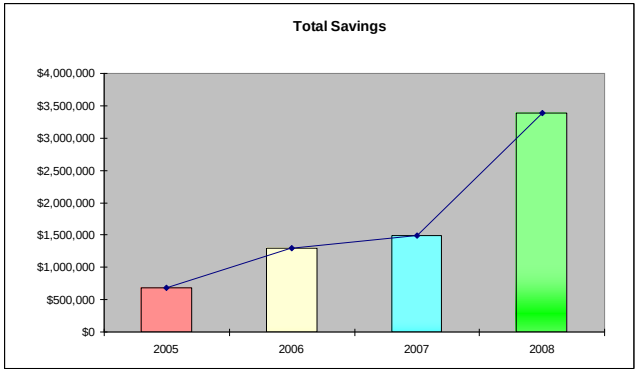
1. A need to improve the facilities with the lowest performance
2. A need to plan savings for facilities with few projects
3. A need to standardize on energy conservation measures
4. A need to provide training to Facility Managers and Building Operators

Follow Up Items/Unresolved Issues

- BAS tune up schedule

Prepared By: Dave Crum
Last Revised: 30 January, 2009

- Activities planned to meet goals for coming year and set projects for subsequent savings
- Plan updated quarterly and progress reviewed annually



New Schneider Electric buildings are Energy Efficient

- The Hive
  - New Paris headquarters housing 1,700 employees
  - Energy target to reduce to 50 kWh / m2 / year

75%
energy savings

30%
Capex &
Opex savings

80
kwh/sqm
final energy consumption in 2010

Passionate about sustainable development

Environment

- Adherence to standards like RoHS, REACH, WEEE
- Eco-design
- ISO14001 certification

Business

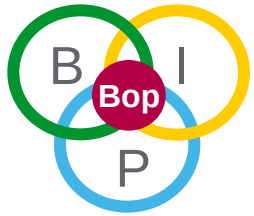
- Head of *Green Grid*
- Signing the *Clinton Climate Initiative*
- Partner of *Alliance to Save energy*

Ethics

- Global compact of the United Nations
- Principles of responsibility signed by every employee

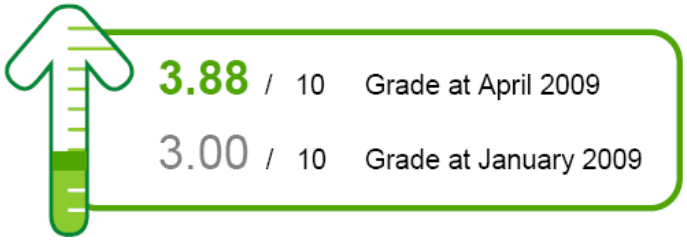
Access to energy

- Access to electricity for 1.6 billion people
- Training disadvantaged young people in the field of energy
- Business angel for local entrepreneurs



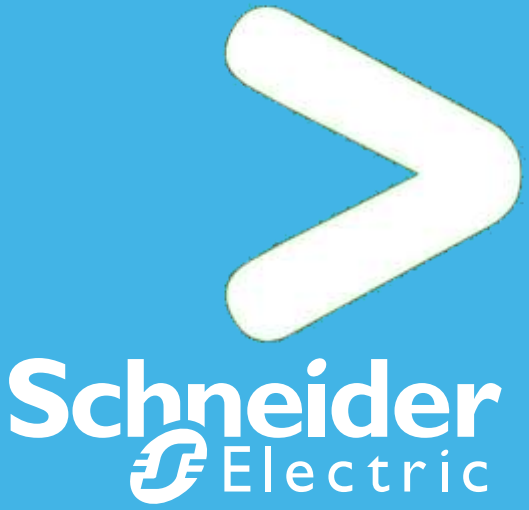
A measured commitment

- The planet & society barometer



Our Customers

Perspectives
& challenges



EE in Industry

The Profile

- Process, Product Driven, Financially Driven
- Healthy Businesses with Good Capital Access
- Pressured for High Return Rates

Energy Opportunities Everywhere

Lighting
Variable Speed Drives
Process Cooling System Optimization
Alternative Fuels
Power Generation
Chilled Water System Optimization
Dust Collection System Optimization
Refrigeration System Optimization

Power Conditioning
Demand Control
Ventilation System Optimization
Air Handling Systems Optimization
Compressed Air System Optimization
Wastewater System Optimization
Heat Recovery Applications
Process Heating Optimization

Usually believe they have done all the low hanging fruit…. But typically its not true.

The challenges

In Industry, the Energy Expert Must Be as familiar with the Production and Operations as with the Energy Systems

The Energy Expert Can Enhance the Perspective of the Facility

Many Knowledge and Visibility Problems Related to Industrial Energy

- How to compare energy efficiencies across processes and products?
- How far can you go without degrading the process or product?
- How to aggregate & track energy usage meaningfully across a company?
- How to ensure continuous focus on the energy and GHG problem?
- How to integrate all the energy tools and systems?

First opportunity is not changing the process but….

- Changing the way energy supports the process
  - Without degrading the products

Second challenge is adapting the process and products

The moment is now

for governments, the public and business

- Regulations are coming
  - 3*20% plan in Europe
  - China 5 year plan commitment to reduce energy intensity by 20%
  - 5m green collar jobs to be created in the US in the next 10 years
  - 20% of stimulus funds going ‘green’

- Companies are acting

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- Public opinion is pushing
  - Hybrid cars sales market shares x4 in the last 2 years
  - Earth Hour has more than 1bn participants in 88 countries
  - Oscar® winning documentary makes global warming the number one topic of conversation

- Technology is here
  - Renewables
  - Energy Monitoring & metering
  - Facility automation
  - Integrated management systems

Energy Savings Opportunity

Real Examples

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Customer solutions across markets

Bella Center (Denmark)

Greening the COP15 venue with energy efficiency building management

Customer Benefits

20% energy savings saved compared to before retrofitting

1,150 tons of CO2 saved per year

- Global supervision
- Power management
- Building management

EcoStruxure

Solaire Direct (France)

A turnkey contract for a complete system including conversion & distribution of photovoltaic electricity

Customer Benefits

2,900 tons of CO_2 avoided/year

Remote monitoring

97.5% availability for 20 years

- Global supervision
- Power management
- Security management
- Services

EcoStruxure

Sun Microsystems (India)

Sun chose APC by SE to combine 13 research laboratories and a leading-edge data centre in Bangalore.

Customer Benefits

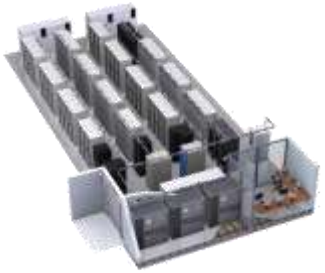
51% Footprint reduction (servers+Storage)

÷3 Number of servers

-17% Electrical consumption

R&D calculation power up **154%**

- Global supervision
- White space management



InfraStruxure

School recaptured 42% of investment in the first year

Situation

- 200,000 square foot private school in Houston, TX
- Energy costs had increased 30% in two years
- Wanted to go green

Challenge

- Administrators would only approve going green—if also financially attractive.

Solution

- Optimized HVAC
- Lighting retrofit
- Utility bill optimization

Results

- $101,667 projected annual energy savings
- 42% return on $240,000 capital investment in the very first year—even without energy rebates or incentives.

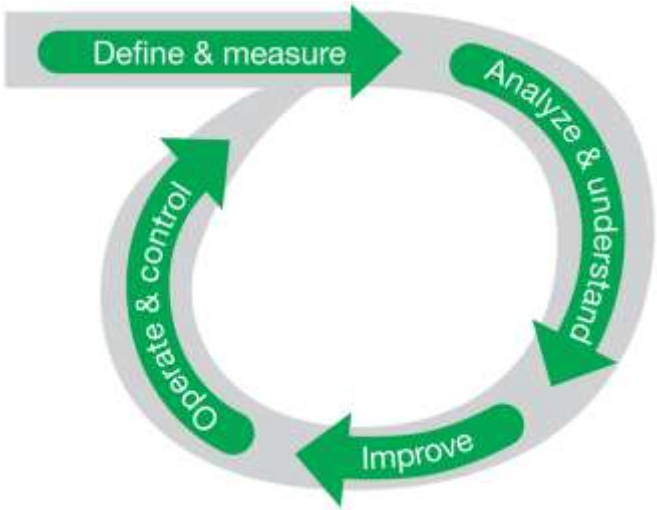
$240,000 x 42% = $101,667 saved

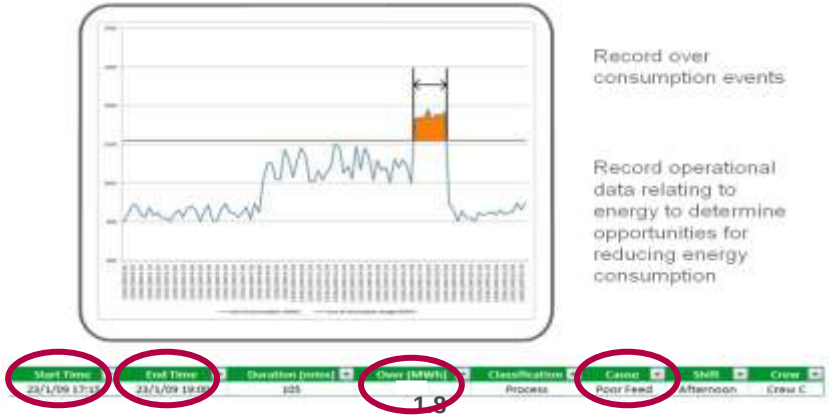
Plant X Current Energy Action Plan Year 3

Recommendation	Cost Savings	Project Cost	Simple Payback
Boiler Efficiency Improvement	$75,980	$11,000	0.14
Continuous Blowdown Control	$68,793	$30,000	0.44
Steam System Maintenance	$75,980	$0	0.0
Line Turbine Vent Condenser	$10,878	$18,000	1.7
Compressed Air Optimization	$62,370	$123,400	2.0
Dyer Exhaust Humidity Control	$478,620	$135,000	0.28
Vacuum Pump Water Recycling	$34,048	$123,000	3.6
Fan Pump Variable Frequency Drive	$124,024	$240,000	1.9
Waste Heat Recovery	$1,327,004	$1,000,000	0.75
Total	**$2,257,697**	**$1,680,400**	**0.74**

Production Energy Optimization

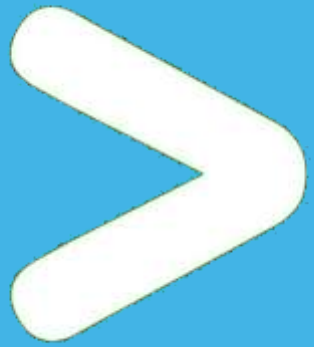
- Support **best in class solutions** for operations management and energy management
- Engaging **Energy Experts with Process Experts to optimize and sustain savings**
  - Produce a fast ROI
  - Follow **continuous improvement approach**
  - Enable to reduce energy consumption per unit produced
- Information based energy management
  - Improve energy forecasting & **event based visibility**





Managing Sustained Energy Savings

The message we deliver to our customers



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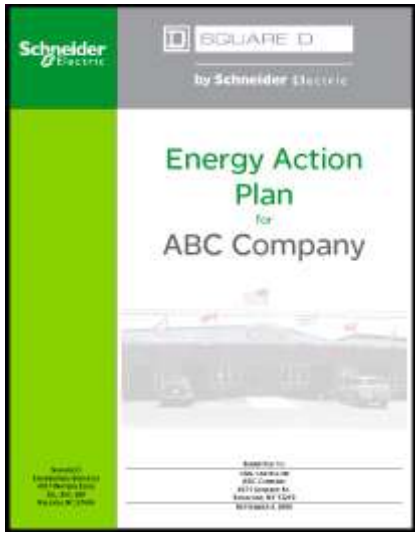
Energy should be an approach of continuous interaction and improvement

Commitment must be for Implementation of Results
Not Identification of Ideas



In a dynamic process, changes and updates are made to the Energy Action Plan to reflect product and process changes, capacity, contingency planning, equipment replacement, and other inherent system changes.

An Energy Action Plan is More than an Energy Audit

Through semi-annual meetings, site visits and ongoing communication, the Energy Action Plan projects evolve to meet the site's changing landscape.

Year 3

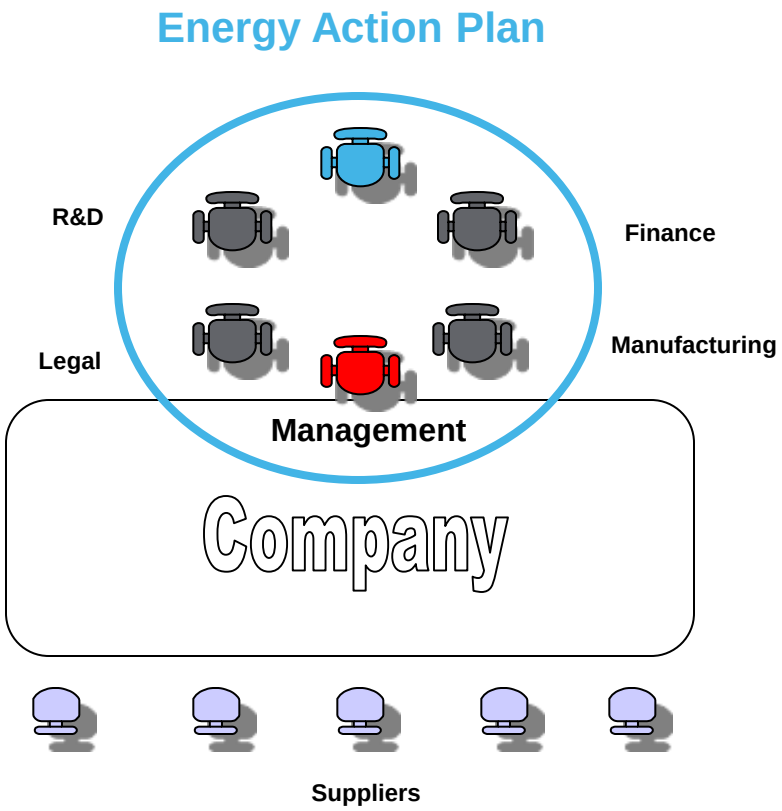
Year 2

Year 1

Recommendation	Electrical Demand Savings (kW)	Electrical Usage Savings (kWh)	Natural Gas Savings (dT)	Cost Savings ($)	Simple Payback (years)
Condensate Return Upgrade	*7*	*617,000*	*$0*	*$16,690*	*0.2*
Air Compressor Optimization	*41*	*194,400*	*$0*	*$18,170*	*0.3*
Cooling Tower Optimization	*13*	*224,200*	*$0*	*$7,150*	*0.6*
On-Site Electrical Generation	*904*	*502,100*	*($5,380)*	*$20,400*	*1.5*
Enthalpy Control of HVAC System	*189*	*1,662,680*	*$230*	*$59,440*	*2.2*
Space Temperature Control	*38*	*483,000*	*$230*	*$16,110*	*2.9*
Totals	1,192	3,683,380	($4,920)	$137,960	1.3

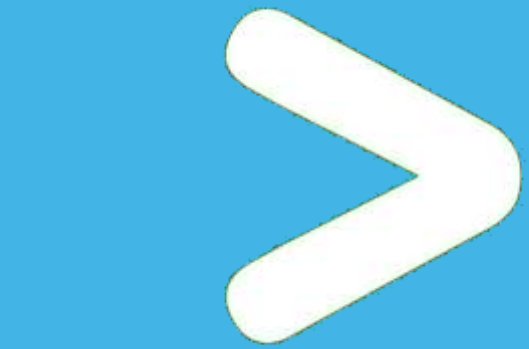
Strategic energy planning must have a seat at the table

- Energy becomes part of company strategic planning
- The Program Uses a dynamic Energy Action Plan that's continuously updated



Sustained Energy Savings

What are the barriers?



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The Barriers

1. **People, people, people**
   - Skills and knowledge
   - Management, leadership, uncertainty, …….

2. **Visibility**
   - Sub metering, performance, intensity,…

3. **Tools**
   - M&V, Diagnostics, Analytics, Benchmarking,…..

4. **Technology**
   - We have what we need, but improvements can come

Make the most of your energy

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Case Studies (4)

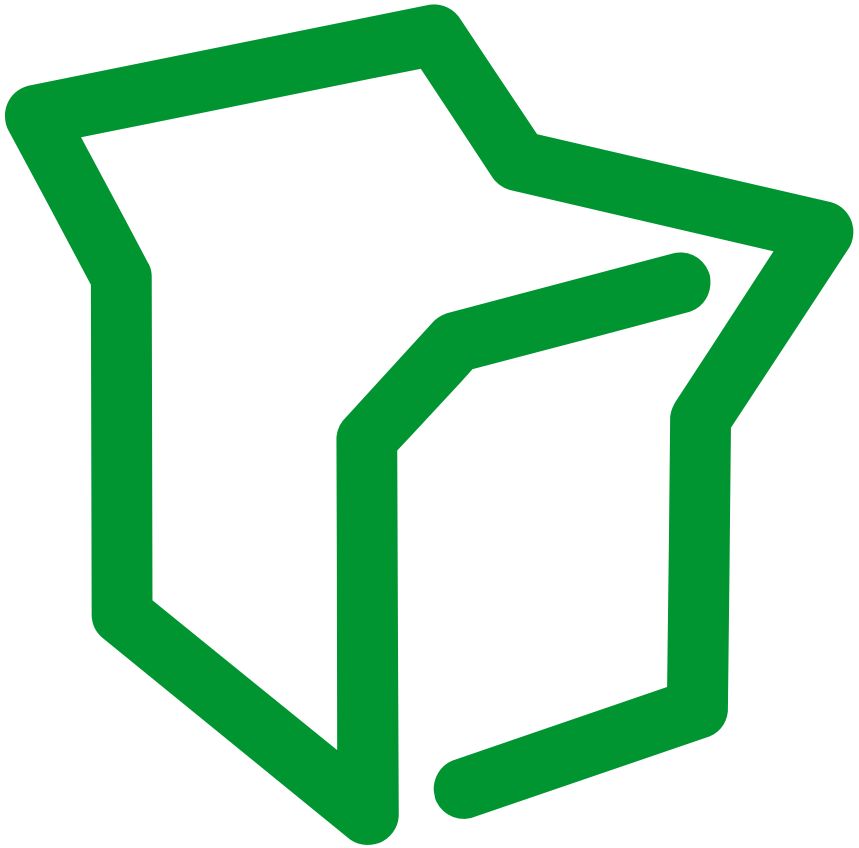
An Energy Action Plan for a Large Manufacturing Facilities:

Facility Type: Pulp/Paperboard, Two plants

Contract Term: 12 Months, Renewed by Customer for Third Year

Total Savings (Year 1): $1,215K in Plant 1, Payback was one year

Project Description: The TEC team conducted a study and produced energy action plans which included an energy dashboard, boiler O_2 trip controls, a switch from 150 to 30 psig steam sparging, powerhouse piping, compressed air system optimization, variable frequency drives and lighting retrofits.



Plant 2 Current Energy Action Plan Year 3

Recommendation	Cost Savings	Project Cost	Simple Payback [years]
Boiler Efficiency Improvement	$75,980	$11,000	0.14
Continuous Blowdown Control	$68,793	30,000	0.44
Steam System Preventive Maintenance	$75,980	$0	0.0
Line Turbine Vent Condenser	$10,878	$18,000	1.7
Compressed Air System Optimization	$62,370	$123,400	2.0
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Vacuum Pump Water Recycling	$34,048	$123,000	3.6
Fan Pump Variable Frequency Drive	$124,024	$240,000	1.9
Waste Heat Recovery	$1,327,004	$1,000,000	0.75
TOTAL	**$2,257,697**	**$1,680,400**	**0.74**

An Energy Action Plan for a Large Industrial Site:

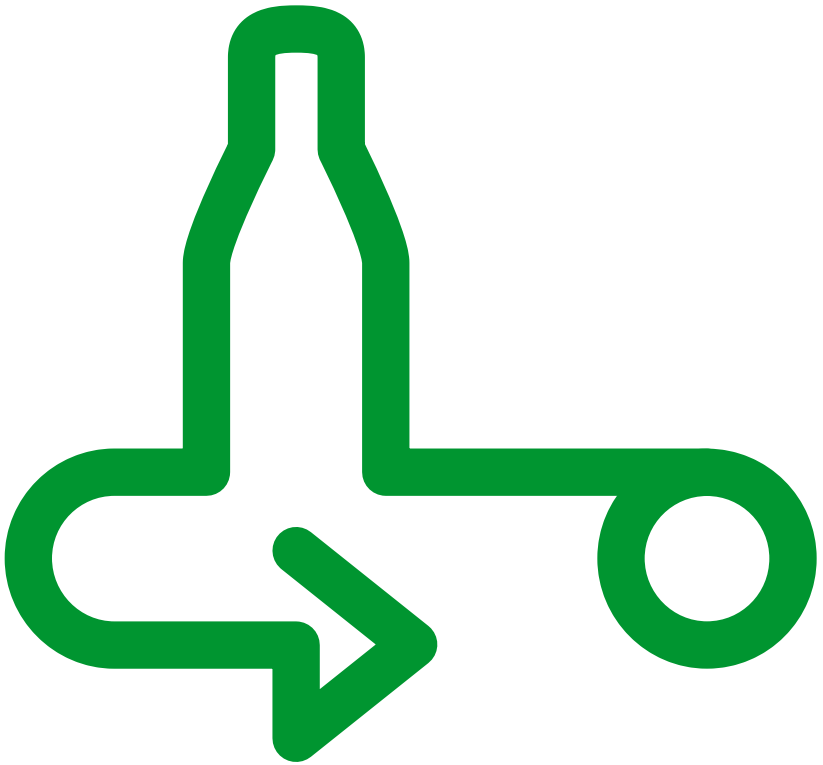
Facility Type: Packaged Food

Contract Term: 12 Months, Renewed by Customer for Third Year

Total Savings: Year 1 Process Energy systems - $460K; $2.3 million 2007 and $4.0 million 2008 in cogen operation

Currently recommending $700K savings opportunities in boiler and chiller systems.

Project Description: The TEC team conducted a study and produced an energy action plan which included demand control strategies to profit from utility deregulation, and a variety of Mechanical System improvements.



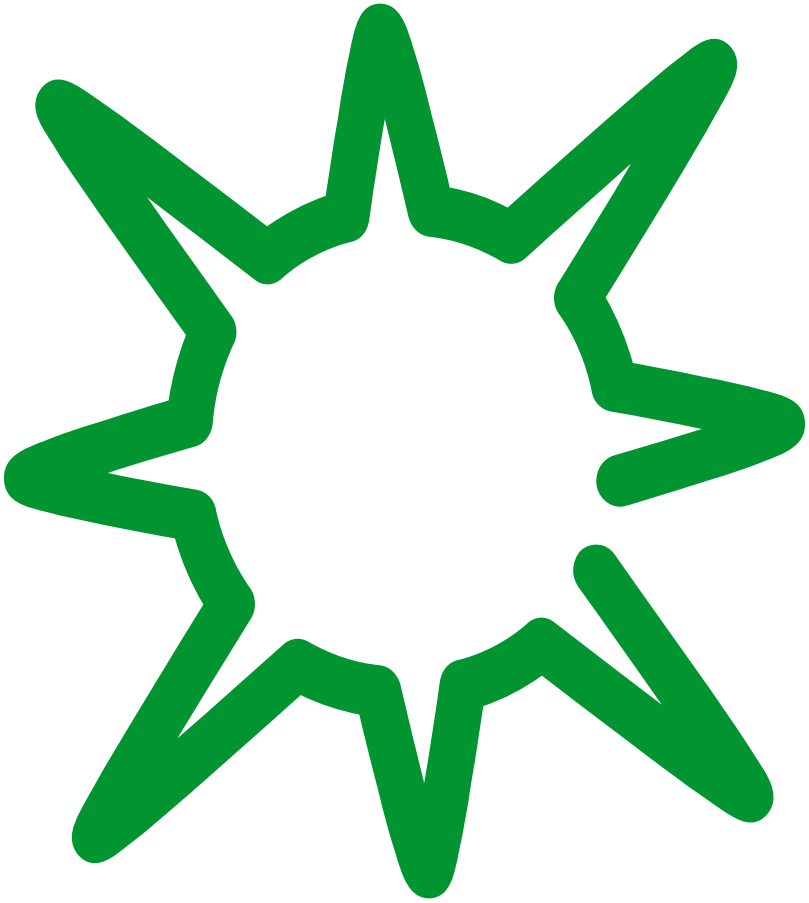
A Solar Photovoltaic Feasibility Study for Remote Facilities:

Facility Type: Agrichemical, 60 sites

Contract Term: 3 Months

Project Description: Decision criteria on the installation of a photovoltaic solar array including the identification of the best candidate site based on economic criteria including: availability of incentives, generation potential, and specific applicability.

For the site selected, proposed systems architecture and economic analysis which will include installation and maintenance costs, rebates and incentives, tax credits and simple payback.



A LEED Certification Plan for a Government Facility:

Facility Type: Nuclear Resource Production

Contract Term: 6 Months

Project Description: A site analysis to accomplishing the first step in the LEED certification process. The analysis gauged the feasibility for and projected the LEED NC certification level that is most realistic and achievable for the site. The study educated takeholder on the LEED NC certification process and the phases involved in the future. The report provided a roadmap for management to follow throughout the LEED certification process.