The Green Campus
Turning Energy Efficiency into A Source of Competitive Advantage
Driven by rising energy costs and the pressing need to save our environment, the energy efficiency agenda is making its way into the Boardroom of many corporations.

Equally important, energy efficiency also offers a real opportunity to build a source of competitive advantage for the corporations that master the capabilities, management systems, and tools required to transform this area of “continuous energy improvements” into a part of the corporate culture or DNA.

Seen from this angle, “Green is the next Lean” and can generate the next S-curve of value generation, while contributing to brand building through environmental citizenship.

However, green transformations, like all other transformations, are easier said than done. The fact is that most transformations fail to sustain impact. In response to this, McKinsey has launched the Green Campus in collaboration with the Government of Singapore to help corporations build precious capabilities needed to drive substantial energy efficiency improvements that can be scaled and sustained across the organization. This is achieved not by classroom training, but through “learning by doing” in a unique experiential environment situated in a live refinery on Jurong Island - the Green Campus.

McKinsey is truly excited to help corporations take advantage of “Green as the next Lean” wave and build a sustainable competitive advantage through the capability offerings at the Green Campus.
New energy challenges are arising…

It is no news that oil prices will continue to rise amid the fast growing demand from emerging economies and risk of unstable supply, posing a significant cost impact across many industries.

If we sum up the annual energy costs of the world’s top 10 energy-intensive industries, it will be a bill amounting to USD 1.8 trillion.

This is more than the GDP of India – the 9th largest economy in the world!

…making energy efficiency a strategic imperative in this decade

By implementing energy efficiency improvements, companies can reduce energy costs by at least 10-15%.

This makes energy efficiency a strategic initiative worth over USD 300 billion!

At the same time, the corresponding CO2 reductions can reach 1.8 gigatons, which translates to a potential 4% reduction in global greenhouse emissions.
However, Green Transformations are extremely difficult to sustain

However, most efforts fail, as companies underestimate what it takes to realize this and maintain the improvement. Often at the heart of the failure is an insufficient focus on the non-technical aspects of transformation.

1. Not enough leadership capacity
2. Lacking capabilities and knowledge
3. Poor accountability and performance dialogues
4. Misalignment of aspirations across organization

This leaves CEOs to wonder…

McKinsey has developed an integrated transformation model

Failed transformations = 90
Successful transformations = 10

How do I establish a substantial, scalable, and sustainable transformation approach?

Technical system: “The technical processes, decision support tools, systems and resources that create value”

Management system: “The formal performance management tools and systems (e.g., metrics, meetings, roles) supported by the right organization structure to drive results”

People system: “The right people with the right skills, mindsets, behaviors and ownership, both individually and collectively”
As lasting Green capabilities are best-built in an experiential environment…

All empirical studies and research suggest that adults will best build lasting capabilities through "learning by doing" in a natural yet risk-free environment.

Knowledge retained from different learning approaches

- Books and PowerPoint: 10%
- Simulations and games: 32%
- Shop floor training: 65%
- Pilot for a lean transformation: 65%

…the Green Campus uses a live refinery setting to teach participants
A snapshot of what you will see when you visit McKinsey’s Green Campus in Singapore

The Green Campus leverages the Chemical Process Technology Centre, which is wholly managed and operated by Petrofac Training Services.

Package 1: Furnace
- Create understanding of impact of waste in energy transfer in furnace
- Demonstrate levers to improve furnace efficiency
- Conduct live, interactive changes to realize impact

Package 2: Heat Exchangers
- Create understanding of impact of circuit design and maintenance on heat transfer efficiency
- Demonstrate impact on parameters by changing flow

Package 3: Distillation
- Understand requirements to maximize profits by optimal distillation
- Understand operational costs & tradeoffs required to achieve this

Package 4: Cooling Water System
- Introduce elements of pumping system design
- Demonstrate levers to improve pumping efficiency

Package 5: Air Compressors
- Create understanding of waste in compressed air production and consumption
- Conduct live tests, monitor impact on power usage

Package 6: Fin Fans
- Introduce concepts to optimize usage of fin fans
The learning experience at Green Campus is brought to life... through a suite of experiential and interactive learning tools

- Comprehensive toolbox with 21 training modules across technical, management, and people systems
- Proprietary Resource Efficiency Deployment Engine (RedE) web-based system with close to 100 energy saving levers
- Real-life 2-year transformation business case accelerated over the curriculum
- Cross-functional role-plays of 8 key organization appointments to simulate real-life scenarios
- 2 custom-made iPad apps to provide interactive learning on 6 plant systems in the Green Campus

Example: RedE database system

- Proprietary database of energy saving levers
- Instant estimation of energy and CO2 savings
- Detailed explanation on how to execute lever
- End-to-end project management of initiative

Impact achieved

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<thead>
<tr>
<th>Impact achieved</th>
<th>Min</th>
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<tbody>
<tr>
<td>Achieved energy savings</td>
<td>10%</td>
<td>20%</td>
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</table>
A typical day in Green Campus…

09:00 am
Check-in with Omco’s CEO and track progress against 30% energy efficiency target

10:00 am
Participate in lecture to learn how to identify and quantify energy losses on the shop floor

11:00 am
Practice concepts and consolidate new knowledge with interactive apps, polls, and quizzes

01:00 pm
“Go and see” concept – applying technical concepts at the plant to identify energy losses

03:00 pm
Use role-plays to learn communication & collaboration skills needed to drive effective change management

06:00 pm
Syndicate plan of action, launch corrective actions, and drive performance dialogues

08:00 pm
Pool together best practices, share key lessons learnt, and build relationships with colleagues and faculty

…is filled with interactive and practical learning sessions
Accreditation of fieldwork leads to lasting results

The Green Campus energy efficiency certification system is a structured pathway to ‘black belt’ level that consolidates learning at every stage and ensures lasting results of Green Transformations.

Profiles of our expert faculty

Dr. Mads Lauritzen, Expert Principal, Bangkok
Mads has over the past 13 years led some of McKinsey's largest operations transformations globally, and today heads McKinsey's South East Asia Operations practice. Mads is the Global Leader of McKinsey's Green Campus.

Dr. Pieter Hoek, Senior Expert, Singapore
Pieter brings deep expertise accumulated over 25 years with Shell, Thai Oil and Alliance Refining Co. He was a founder of the energy efficiency program at Thai Oil from 1999. He also led the Global Business Process Standardization initiative for Shell’s manufacturing supply distribution.

Bryan Slow, Engagement Manager, Singapore
Bryan has over 12 years of refining and petrochemical experience. He led many transformations for several large downstream clients. He is part of McKinsey’s global Oil and Gas practice. Prior to McKinsey, he worked for ExxonMobil.

Dr. Ken Somers, Senior Expert, Antwerp
Ken has served clients across all industrial sectors, including refineries, steel makers, and specialty chemical producers across Europe, Middle East, North America and China. He leads Green Transformation knowledge development within McKinsey.

Markus Hammer, Senior Knowledge Expert, Lisbon
Markus is responsible for managing the global Resource Productive (a.k.a. Green) Operations service line. He has delivered distinctive solutions and insights on operations topics such as lean, green and capability building to clients world wide. He is one of the top-authors on McKinsey’s Operations Extranet and a member of McKinsey's global Model Factory Management team.

Jonathan Ng, Head of McKinsey Innovation Campus, Singapore
Jonathan serves clients in Asia, Australia, Europe and Middle East extensively on large operations transformations and turnarounds. He heads McKinsey’s Innovation Campus, of which the McKinsey Capability Center Green Campus is part.

Rajeev Tee Tan, Principal, Jakarta
Rajeev Tee is one of the leaders of McKinsey’s Lean Operations Practice in Asia. Over the past 9 years, he has led a wide range of client engagements across industries and throughout Asia and Europe on topics of performance transformation, lean operations improvement, and growth strategy.

Thomas Koch Blank, Expert Associate Principal, Stockholm
Thomas has helped multi-national companies, especially in the basic materials and mining industries, to improve their energy efficiency, both at a company level and through industry wide effort.

Harsh Choudhry, Specialist, India
Harsh is a Specialist Consultant with McKinsey’s Energy Efficiency service line. Energy and sustainability have been his focus for the last 5 years. During this time he has completed several energy efficiency projects aimed at plant improvements, company strategies and government policy, across Asia, Europe and USA.
The Green Campus draws on a wealth of Green expertise and know-how...

McKinsey has a long track record in Green Transformations. In fact, Green Transformations are our largest area of activity globally. Over the past 5 years, Green Transformations alone account for 28% of our activities or more than 500 projects, a significant portion of which took place in Asia.

Research on transformational change

- 4,000 Executives surveyed providing input on transformational change attitudes and practices
- 2,400 Transformational change engagements reviewed to distil lessons learned in the past two years
- 300 Interviews conducted with clients and experts, including people in learning, human capital/HR, strategy, operations, and sales/marketing
- 20 Tours of globally advanced learning companies completed
- 2 Years dedicated to developing and refining our understanding

Experience with transformational change

% of transformation programs by industry (100% = 2,400)

- Energy: 20%
- Auto and assembly: 10%
- Travel and logistics: 9%
- Consumer goods/retail: 16%
- Financial institutions: 19%
- Pharmaceutical/healthcare: 14%
- Technology: 11%
- Other: 300

Oil refining, Gas processing, Petrochemicals, Pharmaceuticals, Power generation, District cooling, Waste treatment, Metals processing, Large scale food processing, Large scale beverage producers

...to meet the needs of various industries

Our Green Campus can help companies of all sizes across the process industry succeed in their Green Transformation journeys.
Curriculum offerings can be tailored to different levels of participants...

Did you know?
With energy transformation, a small-sized steel company with annual revenues of SGD ~16 million can expect annual potential energy savings in the order of SGD 450,000.

Energy savings vs. program cost

SGD Thousands

<table>
<thead>
<tr>
<th>Potential energy savings</th>
<th>Estimated program cost</th>
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<tbody>
<tr>
<td>450</td>
<td>27</td>
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</table>

Did you know? Baseline example

1 Per pax cost estimation is based on “Learn, Connect, & Activate” SME program; actual cost may vary with the size of transformation, number of change agents sent for program, and total number of participants per class.

...starting from the top: CxO training example

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Welcome address, agenda for the day, objectives and expectations</td>
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<tr>
<td>09:15</td>
<td>Safety briefing and ground orientation</td>
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<tr>
<td>09:30</td>
<td>Introduction to Green Campus: what is the imperative of energy efficiency?</td>
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<tr>
<td>10:15</td>
<td>Understanding how Technical Systems fit in the overall transformation</td>
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<td>10:30</td>
<td>Load curve module - Theory</td>
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<tr>
<td>10:45</td>
<td>Green Campus plant walk and participant role-plays</td>
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<tr>
<td>11:15</td>
<td>Load curve module – Synthesis, presentation, feedback</td>
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<tr>
<td>11:30</td>
<td>Performance dialogues module - Theory</td>
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<tr>
<td>11:45</td>
<td>Participant role-plays on performance dialogue and providing feedback</td>
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<tr>
<td>12:00</td>
<td>Performance dialogues module – Synthesis, presentation, feedback</td>
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<tr>
<td>12:15</td>
<td>Lunch</td>
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<td>13:00</td>
<td>Transformation design module - Theory</td>
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<tr>
<td>13:15</td>
<td>Real-life transformational business case</td>
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<tr>
<td>14:00</td>
<td>Transformation design module – Synthesis, presentation, feedback</td>
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<tr>
<td>14:30</td>
<td>Wrap-up and next steps</td>
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<tr>
<td>15:00</td>
<td>Departure</td>
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</table>
Best practice toolkit on technical systems...

- **Energy value chain**: Map and quantify energy as it flows through the system.
- **Current state analysis**: Identify energy consumption baseline along the energy value chain.
- **Theoretical limit**: Identify minimum level of energy consumption.
- **Energy loss framework**: Identify energy losses.
- **Load curve**: Quantify operational losses (distillation column as an example).
- **Process parameter analysis**: Quantify losses due to sub-optimal control of key parameters (furnace as an example).
- **Pinch analysis**: Quantify losses due to sub-optimal reuse of heat (heating network as an example).
- **Network loss analysis**: Quantify losses in distribution networks (compressed air system as an example).
- **Motor analysis**: Quantify losses due to inefficiencies in motors and their applications.
- **Cost curve**: Quantify losses due to energy demand-supply mismatch (cooling systems as an example).
- **Energy sourcing**: Determine right sourcing strategy.
- **Contracts**: Structure and optimize contracts.
...management systems...

Transformation design
Understand overall transformation framework: technical, management and people systems

Energy performance review
Develop insights on management and people system diagnostics

Implementation road map
Prioritize and sequence initiatives to draw up transformation workplan

Performance monitoring
Design effective KPIs, targets and performance dashboards

Performance dialogues
Develop system and practice coaching employees

...and people systems

Root cause problem solving
Diagnose key drivers and develop solutions

Communication and influencing techniques
Learn storytelling and influence model to motivate organization

Conflict management
Practice resolving conflicts

Continuous improvement
Learn best practices in sustaining ongoing transformation impact

SOURCE: McKinsey Performance Transformation Campus Step Manager Operations Supervisor – will design, diagnose, and align?

Diagnose, dialogue, and systems?

Start continuous 'skill' review, and monthly KPI metrics, and cascaded system, solving management?

Prioritize and sequence best practice toolkit on people systems and 'skill' review.

Develop system and practice coaching employees.

How do superiors change direct influence elements of team?

Don't express secret desires, don't violate anyone's rights, learn storytelling and Influencing meetings.

What is achievement building mindsets, and immediate feedback?

Get lack of conviction in the future, and no understanding, learn best practices in supporting ongoing transformation impact.

The influence model encourages resisting and influence shift by pulling without the将以人, the individual need to change.
For questions and inquiries please visit our website www.greencampus.mckinsey.com or contact:

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