

## Lean & Green<sup>1</sup>

*Professor Peter Hines, Chairman of the Lean Enterprise Research Centre at Cardiff University and S A Partners explores how lean & green should and can be brought together.*

It was just after the turn of the millennium that Jim Womack wrote:

*“Lean thinking must be “green” because it reduces the amount of energy and wasted by-products required to produce a given product...Indeed, examples are often cited of reducing human effort, space, and scrap by 50 percent or more, per product produced, through applying lean principles in an organisation....this means that...lean’s role is to be green’s critical enabler as the massive waste in our current practices is reduce”.*

However, apart from a strong movement in the west coast of the United States, progress seems to have been slow on this Lean & Green journey. This is inspite of the relentless march of Lean Thinking across industry sectors and the heightened awareness of green through high profile activities such as the Stern Review.

One of the first to put the green agenda on the map was the then Norwegian Prime Minister, Dr Gro Harlem Bruntland when she introduced the concept of sustainable development, describing it as being made up of three areas: economic, social and environmental sustainability. For a typical company or organisation we might translate this as a focus on a ‘respect for profit’ (economic), ‘respect for people’ (social) and ‘respect for environment’ (environmental). Where to position your business is a matter of choice. However, those students of Lean Thinking who have achieved more than fleeting success will know that to achieve economic success you require a major focus on your people. Taking a further step to encompass the environment seems only logical as this can also yield both economic and social benefits.



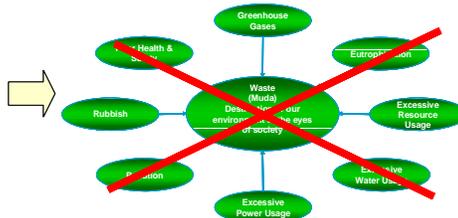
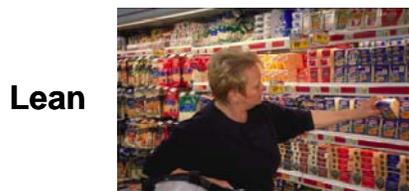
To think in very simple terms:

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- Lean might be described as understanding customer's needs and values and then reviewing the value streams that produce them so that the traditional eight wastes can be minimised
- Green might be described as understanding society's needs and values and then reviewing the system that delivers them so that the environmental wastes can be minimised

So what is the difference? Well apart from the fact that individual customers are multiplied to become society and the environmental wastes have a slightly different character than the traditional lean wastes, not a lot.



To unpack this a little further, the traditional eight lean wastes consist of:

- Overproduction
- Defects
- Unnecessary Motion
- Unnecessary Inventory
- Inappropriate processing
- Transportation
- Waiting and
- Lost People Potential

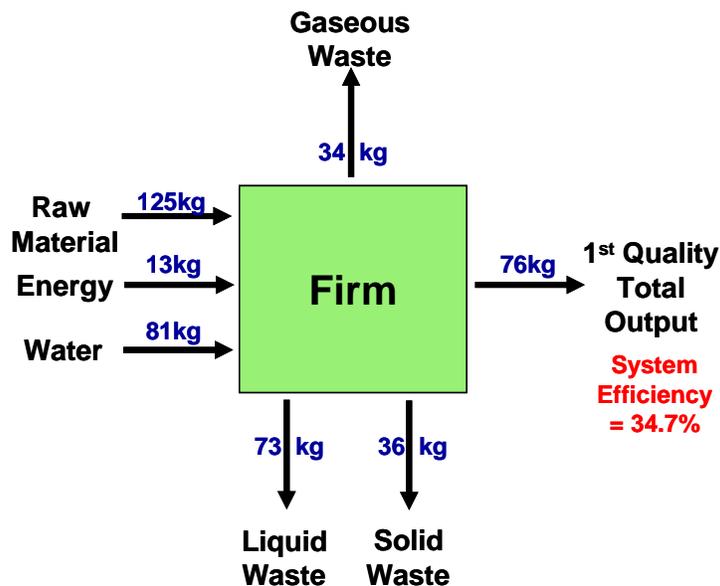
The eight green wastes can be categorised as:

- Greenhouse Gases
- Eutrophication
- Excessive Resource Usage
- Excessive Water Usage
- Excessive Power Usage
- Pollution
- Rubbish and
- Poor Health & Safety

Although these wastes have different types of categories, both sets are designed to increase the efficiency and effectiveness of the value stream or system. In order to do this a traditional lean thinker would seek to map out these wastes in order to identify how they might be reduced or eliminated. After many years of working with Value Stream Mapping we have found that there is no such thing as the ‘right’ tool to do this. It takes a combination of diagnostic approaches, all with their strengths and weaknesses.

Need	Lean Diagnostic Toolkit								
	Product Family Analysis	Process Decomposition	Big Picture Mapping	Process Activity Map	Four Fields Map	Supply Chain Response Matrix	Product Variety Funnel	Quality Filter Map	Demand Amplification Map
Gain an overview	●	●	●			●			
Decide where to start	●	●							
Scope a process		●	●		●				
Working with physical products	●		●	●		●	●	●	●
Working with information	●		●		●				
Getting into fine detail				●	●		●	●	●
Working across organisations			●			●			

Need	Green Diagnostic Tools									
	Green Impact Matrix	Green Systems Boundary Analysis	Green Big Picture Mapping	Eco-Maps				Value / Impact Ratio	Life Cycle Assessment	Carbon Footprint Analysis
				Energy	Water	Emissions	Landfill			
Gain an overview	●	●	●					●		
Decide where to start	●	●	●					●		
Scope a process	●	●	●							
Walking the Flows				●	●	●	●			●
Getting into fine detail				●	●	●	●		●	●
Working across organisations								●	●	●



In a similar way there is no single ‘right’ green mapping tool, more a range of approaches for different stages of the process. Although space here does not permit us to illustrate all of these, it might be useful to have a look at one of the simpler tools, Green System Boundary Analysis, a tool used to great effect by carpet tile maker Interface.

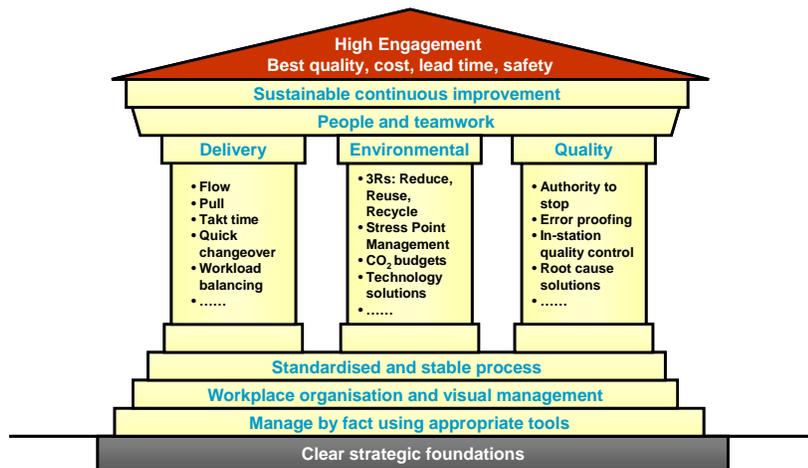
What we are doing with this tool is looking at a balance of

how much material is inputted into the firm (in terms of raw material, energy and water), how much (gaseous, liquid and solid) waste is produced and consequently how much good product is made. A simple calculation can then show what percentage of good product is made by weight. In this example 219kg of input produces 143kg of waste and 76kg of good product, a system efficiency of 34.7%. This Current State Map may be used as a basis of a Future State Map where this is increased to 50% plus.

Of course, rather than seeing the lean mapping tools as completely separate toolkits they might be used in combination. Indeed, the traditional lean mapping tools are also likely to reduce a firm's environmental impact and the green mapping tools will also help financially.

In this short article we will now look at integrating the lean and environmental toolkits for improvement activity. Let's explore a Lean & Green Model of Excellence. In true lean style we will use a house structure.

The Lean & Green Model of Excellence has at its base clear strategic foundations out of the Strategy Formation activity. Upon this are built the control platforms of managing by fact, workplace organisation and standardised stable processes. Above this now sit three pillars:



- Delivery: how to create perfect delivery through application of the traditional lean principles of pull and flow
- Quality: how to create the perfect product at source – the often forgotten pillar within Lean Thinking
- Environment: how to work in an environmental efficient and effective way

The approach is capped off by a focus on people to ensure teamwork, continuous improvement and high levels of engagement.

Of course working on Lean & Green requires far more than the focus on value, waste, mapping and implementation tools described here. However, this might be a useful starting point for you to think about how this integration might work in your business.

*For further information please or details of forthcoming courses on Lean & Green please contact Professor Peter Hines at [peterhines@hotmail.com](mailto:peterhines@hotmail.com) or visit [www.leanenterprise.org.uk](http://www.leanenterprise.org.uk) and [www.sapartners.com](http://www.sapartners.com).*