



## Environmental impact from Golf clubs

**Per Dahlen**  
iGolf Corporate Advisory Council  
Renewable Energy and Waste Management




**Per Dahlen**  
Cleantech Entrepreneur and Investor



- Partner, Portelet Asia Pte. Ltd., Singapore, 2009
- Previous entrepreneur experience:
  - Founder, CEO, AUM Business Creations, Singapore, 2007
  - Founder, CEO of Phoenix IT, Spain, 2003
  - Founder, COO and CTO of ViaCarla Networks, Spain, 2000
- Education:
  - BSc Innovation Engineering, HH, Sweden
  - MBA IESE-1996, Spain (Best EU Business Plan 1996)
- Other:
  - Member of iGolf Corporate Advisory Board
  - Ambassador of Lidköping, Sweden
  - Married to Kelly Phua (Singapore) and have one son, Karl, 3 years old




## Global Warming

What is happening in the world?



Karl: 34

Source: <http://www.grinningplanet.com/2004/01/27/global-warming-1000-v3-copyright1.gif>  
Source: <http://www.grids.no/climate/vitalgraphics/taige22.jpg>




## IEA: "Peak Oil in 2020"

Fatih Birol, Chief Economist with the [International Energy Agency \(IEA\)](http://www.iea.org), The Guardian, December 2008: "In terms of non-OPEC, we are expecting that in three, four years' time the production of conventional oil will come to a plateau, and start to decline. In terms of the global picture, assuming that OPEC will invest in a timely manner, global conventional oil can still continue, but we still expect that it will come around 2020 to a plateau as well, which is, of course, not good news from a global-oil-supply point of view." [\[Link\]](#)



## Dec, 2008 – No longer any doubt...



Karl: 14

Source: <http://www.theoilrum.com/tag/stanford>




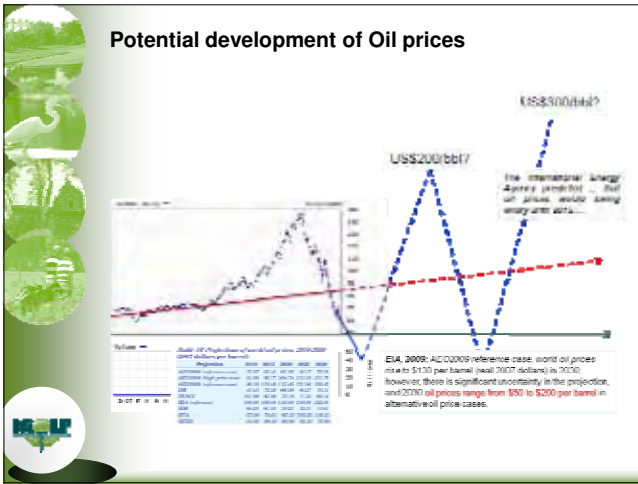

## SE Asia is growing the fastest in the world

Projection of oil demand in Southeast Asia in 2030. Imported Oil as Share of Total Oil Consumption  
Source: APEC 2006



Region	2002	2005	2010	2015	2020	2025	2030
Northeast Asia	~85%	~85%	~85%	~85%	~85%	~85%	~85%
Newly Industrialized Economies	~45%	~45%	~45%	~45%	~45%	~45%	~45%
APEC	~40%	~40%	~40%	~40%	~40%	~40%	~40%
Oceania	~15%	~15%	~15%	~15%	~15%	~15%	~15%
Southeast Asia	~5%	~5%	~15%	~35%	~55%	~65%	~75%





### How does this impact Golf Clubs?

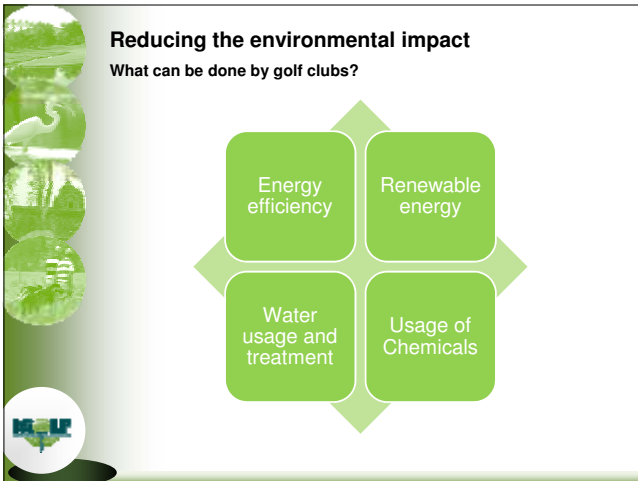
#### Economic and Environmental Impact

#### Environmental

- Golf courses have an important role in creating environmental sustainability.
- Golfers increasingly insist that courses are environmentally sustainable.
- A great opportunity to differentiate a golf course to create a competitive advantage.

#### Financial

- Increasing cost of energy and resources if nothing is done.
- Polluting will cost money, while saving the environment saves costs.
- Environmentally friendly solutions are often very profitable for golf courses.



### Energy Efficiency

Easiest and fastest way to reducing energy consumption

Energy Audit

Analyse results

Reduce footprint

Typical electricity usage

Focus on the large electricity consumers!

### Energy Efficiency

Focus on the large electricity consumers!

#### Air conditioning

- Would it be possible to raise the temperature a few degrees in some areas?
- Do you really need aircon in all facilities, all the time?
- How efficient is the current system?


#### Lights

- Is lights necessary everywhere?
- All the time?
- Would motion detectors be a feasible solution to reduce costs?
- How about more efficient light sources? LED?

### Renewable Energy


Finding new, innovative ways to source energy

Biomass	Solar	Wind
<ul style="list-style-type: none"> <li>Biomass easily accessible from golf courts, gardens and kitchens at low cost.</li> </ul>	<ul style="list-style-type: none"> <li>Large quantities of solar power on courses but may be expensive.</li> </ul>	<ul style="list-style-type: none"> <li>Accessible on some courses.</li> </ul>
↓	↓	↓
<ul style="list-style-type: none"> <li>Gas production</li> <li>Biodiesel</li> <li>Fertilizer</li> <li>Electricity.</li> </ul>	<ul style="list-style-type: none"> <li>Electricity</li> <li>Stand-alone systems</li> <li>Light</li> <li>Heating (air, water)</li> </ul>	<ul style="list-style-type: none"> <li>Electricity</li> <li>Stand-alone systems</li> </ul>





**Water usage and treatment**  
Savings on another precious resource

- Limit usage through planning
- Treatment of water
- Biomass absorber (save 50 % water)
- Leakage prevention




**Use of Chemicals**  
Expensive and bad for the environment


- Limit usage of chemicals
- Seek biological options to chemical substances
- BioFertilizer can be used
- Use manual techniques, such as hand-weeding.

**Creative solutions**  
What is important to think about for your course?

- Find simple solutions that suit your local conditions
- Start the work by performing a detailed audit on current performance.


New course	Existing course
<ul style="list-style-type: none"> <li>• Design the course for sustainability and efficiency.</li> <li>• Consider the more radical solutions that can really make a difference to lower operating costs and attract golfers</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on improving the main energy consumers and polluters.</li> <li>• Try finding solutions that solve several problems at the same time.</li> </ul>




**Creative solutions**  
Small, independent Biogas Generator for golf course


- Recycle waste from kitchen, course and gardens
- Produce BioGas for kitchen
- Produce BioFertilizer
- Save money, and environment
- Works for existing as well as new facility





**Creative solutions**  
Large-scale BioFuel plantations

- Use land surrounding golf course to produce Biomass for producing gas and electricity (and perhaps BioDiesel)
- A 300 ha golf course with 300 ha of Jatropha plants could be made totally independent of power, gas and perhaps fertilizer.
- Works for existing as well as new facility
- Great solution for remote courses or when you really want to differentiate the course.
- Can be community owned and operated




**Creative solutions**  
Use solar to heat water

- Use solar collector to heat water
- Simple, well tried technology
- Low maintenance cost
- Save electricity/gas
- Works for new as well as existing course





## Creative solutions

### Independent solar panels for lighting

- Avoid investing in connecting light sources to grid
- For lighting that is stand-alone in the course
- Save electricity cost
- Be in forefront of technology development
- Differentiate
- Suitable where no cable infrastructure exist to avoid such investment.



## Creative solutions

### Produce electricity locally using solar- or wind power

- Solar- or wind power could be used to produce power locally.
- Need storage or connection to grid to balance production and consumption.



## Certifications

### How iGolf can support these efforts

- Recognize IGOLF Laureate Courses
- Work with committed Indonesian companies
- Introductions and information-sharing

