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Providing academic leadership through the role of Senior Lecturer 1 (Teaching) using the theme of 'Sustainable Energy' as an example

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For me, an academic leader should lead in their area of particular skills, particular insights and particular interests. They should be an amateur in the true sense of the word, i.e. they should love what they are doing. Their ideas should be visionary: ahead in time. If the leader is academic, they are part of the academy: the place of learning.

My friend and colleague Evgeny Yantovsky is part of the academy and a leader. He will be 80 in May. He was formerly the Chief Researcher at the Energy Research Institute of the Russian Academy of Sciences, Moscow. His papers on zero emissions go back to the one with the title *The Thermodynamics of Power Plants Without Exhaust Gases*, which he presented at the World Clean Energy Conference in Geneva in 1991. Yantovsky has been a strong proponent of zero-emissions power plants of the oxy-fuel type. There are now two power plants of this type in the world. The European Union has plans to build twelve more zero emissions power plants by 2014. Yantovsky used to refer to them as *stack-downwards* power plants. I wasn't the one who had the vision, but I did recognise the value of Yantovsky's vision. I try to lead in the same way. The Dublin Institute of Technology has leading publications in this area that go back to 2004.

I would like to quote or paraphrase some parts of a paper that Yantovsky hopes to present at the Dubrovnik Conference on Sustainable Development in May 2009.

"In spite of all the hopes that have been placed on renewable energy, the fossil fuels coal and gas will dominate in this century. The real meaning of sustainability is a way to replace the atmosphere as a receiver of gaseous emissions by the hydro lithosphere as a receiver of liquid effluents that can be stored underground without causing any harm.

We breathe out products of respiration as emissions, but this represents just a tiny fraction of all man-made emissions. The major fractions are from:

- *fuel-fired power plants,*
- *industry, for example steel or cement,*
- *vehicles,*
- *heating of buildings and*
- *incineration."*

The title of Yantovsky's paper for Dubrovnik is *The Zero Emissions City*. If we focus on zero-emissions-power-plants and renewable energy sources and nuclear power, all energy needs within cities can be met electrically, cleanly and sustainably. More generally, if we also consider the parts of the earth that are not cities, on-board fuels will continue to be

required for some types of transport, but clean sustainable energy use is technically achievable.

Each particular technical problem is capable of resolution by engineers and scientists. In fact, engineers have an ethical duty to provide excellent guidance and leadership on the sustainable use of energy. There is no unusual engineering involved: the underlying principles are those of physics, chemistry, biology, mathematics, mechanics, thermodynamics and electrodynamics.

In the Dublin Institute of Technology the Teaching SL1 position is the highest-level teaching position. It is analogous to a Senior Lecturer or Reader position in UK universities or Senior Lecturer in Irish universities. It offers an opportunity to work directly with undergraduate and postgraduate learners.

At Senior Lecturer level, one should be actively engaged in research. In the sustainable energy area, for example, I have fifteen refereed publications since I joined the DIT in 2003. These are all in the name of Dublin Institute of Technology and full details are available through the Institute's web site. They are part of the body of publications of the Dublin Energy Lab as well. The topics of these publications include zero emissions cycles, a proposed zero emissions system for vehicles, use of ion transport membranes for oxygen separation, use of macro algae for solar energy conversion and Stirling engines for energy efficiency.

Before joining the DIT I set up a campus company that specialised in applied thermodynamics simulation and I carried out this type of work at the highest technical level for combined cycle power plants. I also carried out the first engineering analyses for the wave-power device known as WaveBob and, importantly, I recognised and confirmed the validity of the concept. Previously I undertook research relating to energy in buildings, energy efficiency in industry, heat pumps, refrigeration and air-conditioning.

Right now is an exciting time to provide leadership as a Senior Lecturer. Students are enthusiastic about sustainable energy, which gives them strong motivation for the entire discipline of Mechanical Engineering. There has been a major shift from teaching to student-centred learning and developments in e-learning provide wonderful opportunities to do the type of work I really enjoy doing.

I believe that as a learner-supporting SL1 I can provide excellent leadership, through example and encouragement, for colleagues and learners. I will also continue to engage in research and discharge my ethical responsibilities to society in the discipline area of Mechanical Engineering in which I have particular insights and expertise.

I have been a successful academic leader in the area of sustainable energy and other areas for most of my career. I have had the title of Senior Lecturer since 1991. I would be happy to take questions on any of this.