

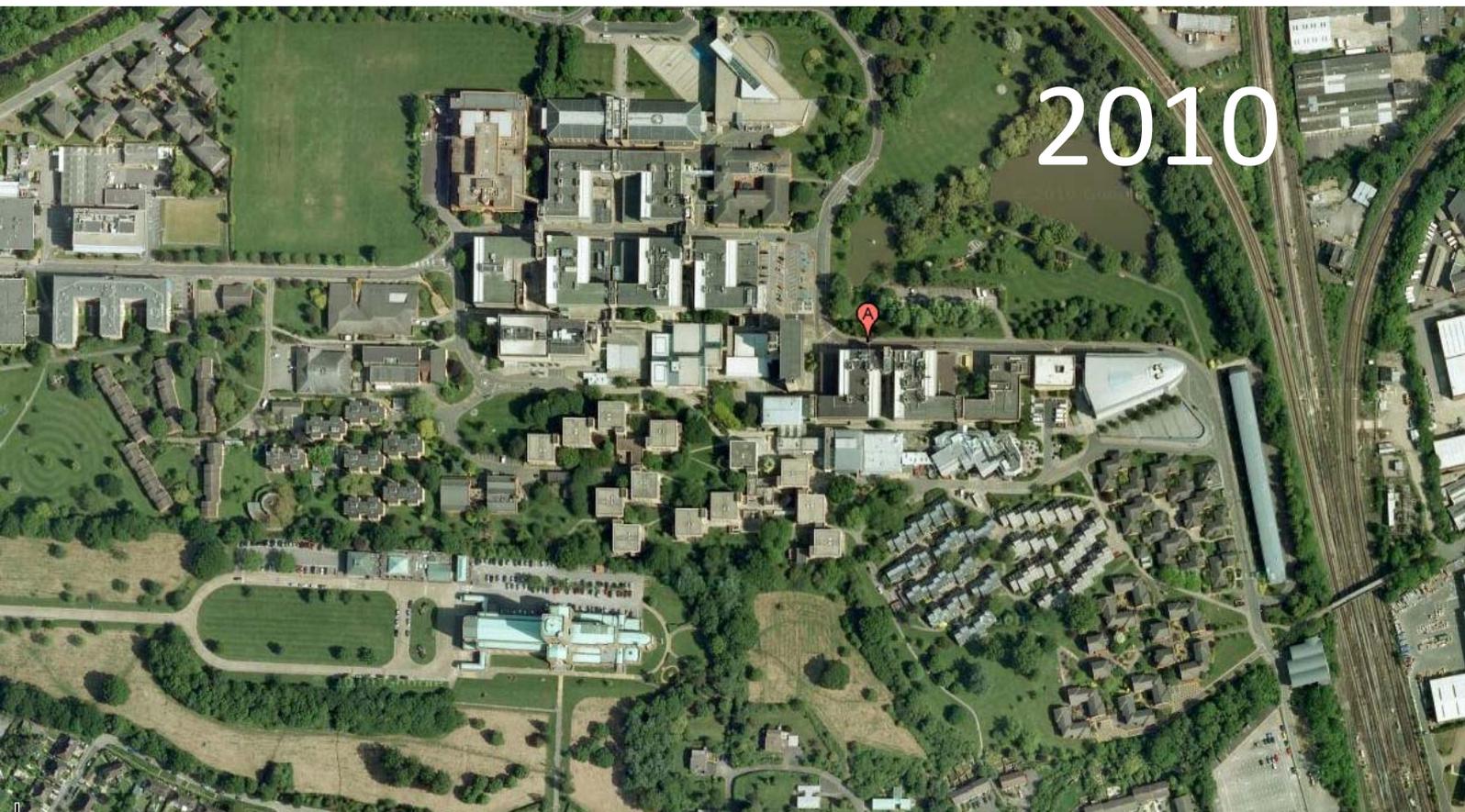
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University of Surrey Engineering Doctorates Market Review

Executive summary

Authors: Ian Cooper, Jason Palmer
Researchers: Amy Tillson, Nic Rogers, Chris Lane



Engineering Doctorates Market Review: Executive summary

Purpose and conduct of the market review

The Centre for Environmental Strategy (CES) has commissioned this review of the market for its Engineering Doctorate (EngD) in Sustainability for Engineering and Energy Systems (SEES) – and of changes in higher education over the next 5 years – as an input into its periodic review of the course in 2011.

Because of constraints on time and funding, the review has for the most part been restricted to information collectable from the internet (see main text below). This restriction is positive in that it reflects how a prospective student, or indeed industrial sponsor, may initially attempt to find out more about the SEES and how it compares with competitor courses available in related areas elsewhere in the UK.

This section summarises the findings of the review, draws a series of conclusions from the information collected about likely impacts on the market for the SEES, and makes a series of recommendations about what the CES needs to do to understand and manage these better.

Government policy

After a period of neglect, there has been a flurry of recent Government activity that may impact on postgraduate education (in sustainability).

- The Browne Review (2010) noted that it is possible that in future, if students are paying higher fees to enter undergraduate education, they will be less likely to participate in postgraduate study and so recommends that trends in postgraduate study should be monitored carefully.
- However the Review has concluded that there is no evidence that changes to the funding of student finance are needed to support student demand or access to postgraduate education.
- This analysis has been criticised as complacent by the National Union of Students whose own 2010 survey suggests that finance is already a significant barrier to postgraduate access.
- The Chancellor's Comprehensive Spending Review (2010) has indicated that the higher education sector will now be shaped by thousands of individual consumer choices and so there are expectations that the sector will change radically over the next 10 years, with unclear impacts on postgraduate education.
- Over the past decade, postgraduate education has grown sharply, mainly through expanded recruitment of overseas students – and there are concerns that this will lead to further erosion of the UK research base.
- Higher Education Institutions (HEIs) are expected to seek to recruit more postgraduate students since there is no cap to the fees they can charge at this level.

Growth in provision of postgraduate courses in the UK

During the lifetime of the Environmental Technology EngD, the provision of postgraduate courses in the UK has grown enormously.

- The Smith Review (2010), *One Step Beyond*, on making the most of postgraduate education, indicates that provision has grown by 38% over the past 12 years, with almost a quarter of students in UK HEIs taking a postgraduate qualification, bringing in an income of over £1.5 bn in 2008-9.
- Fees rose sharply by 48% (in nominal terms) between 2001-2 and 2007-8.
- The *One Step Beyond* Report concludes that the dedicated funding for wider skills training for research students, provided by UK Research Councils, has been extremely effective.

- However it also concludes that postgraduate students need appropriate support, information and advice to get the most from their experience but that this currently lags behind what is being offered to undergraduates
- The One Step Beyond report also recognises the growth over the past 20 years in the provision of professional doctorates and recommends that HEIs should work with Research Councils to develop more multi-disciplinary Centres for Doctoral Training: the RCUK has backed this recommendation.

Growth in Industrial Doctorate Centres and other forms of Professional Doctorates

The EPSRC's Engineering Doctorate Scheme was reviewed in 2007.

- The review panel recommended the extension of such provision, leading to the establishment of the current cohort of 19 Industrial Doctorate Centres, including the continuation (in an evolved form) of some former EngD Centres.
- As a result of this policy, the SEES now faces more direct competition for students, especially from those IDCs recruiting in the same industry sectors, see below.
- This competition is compounded by the growth in other forms of professional doctorates, especially those being offered in Million+ HEIs (post-1992).

Growth in private sector provision of postgraduate courses

Universities UK (UUK) has recently (2010) published a report illustrating how the private higher education sector is emerging as a growing force in the UK as well as elsewhere.

- It notes that the CBI Higher Education Task Force has pointed to the government seeing teaching contracts with private sector providers as a way of reducing costs to the Treasury.
- The UUK Report documents a series of threats, risks and challenges to traditional providers from the growth in private sector, including at postgraduate level, see main text for details.
- Examples are given of the types of private sector provision at the postgraduate level already in place in the UK: none of those in the UUK Report are currently direct competitors to the SEES – but one of the providers cited, UWIC, is already validating a Professional Doctorate for the Centre for Alternative Technology in an industry sector (construction) from which the Environmental Technology EngD serially recruited.

Employer demand

Examining current advertisements for jobs relating to environmental and sustainable engineering identified 18 jobs that graduating EngD students might apply for. Nearly all of the employers cited specialist knowledge relevant to the field of work in their advertisements. Most of them also asked for project management skills, and written and verbal communications skills.

Many employers also asked for an interest in and knowledge of sustainability, and leadership and team-working skills are also common requirements. However, none of the job advertisements referred to research skills.

We also carried our interviews with five large firms known to recruit EngDs in the environmental and sustainability field. To summarise, a majority of these employers say they are looking for skills relating to:

- Environmental legislation
- Ability to work as self-starters
- Ability to get on with others, and
- Communication skills.

Competing courses

There are 14 competitor postgraduate courses by research with taught elements in the field of sustainability - relating to the construction, energy, environment, engineering, water and transport sectors - identified in this review. These are sectors from which the EngD in Environmental Technology recruited and so these courses can be expected to act as competitors for students with the SEES.

- 10 of these courses are IDCs, the other four Professional Doctorates - the latter primarily at Million+ HEIs.
- Between them, these courses are seeking to recruit 100+ students a year, with the SEES another 12
- Typical cohort size is 10-12 students (but Southampton's IDC recruits two or three times as many)
- All of the IDCs are four year courses (full time): the Professional Doctorates are 3 years (full time) and up to 8 years (part time).
- Professional Doctorates are aimed at those who are already 'professionals' or working in 'built environment/engineering professions': IDCs do not specify previous work experience but make providing this a defining feature of the course on offer - the extent of this varies considerably from 'some time ... where appropriate' to 70-80%.
- There are core shared skills that the IDCs suggest students will acquire on these courses.
- The most frequently cited set of these are, in rank order of mention: research methods, management, sustainability, technical skills and leadership – SEES cites all of these.
- A less frequently cited second set of skills is: transferable skills, organisation/time management, team work, communication, reporting/publishing, and environmental – SEES does not cite the first three of these.
- There is only one skill that their websites suggest is being taught on all 15 of the courses: research methods.
- Two skills are cited by only one IDC each: critical thinking and risk management (the latter by SEES).
- So the SEES shares many common ambitions with the other 14 courses about the skills it is seeking to impart.
- As a result, the SEES does not have a clear USP that provides it with differentiated market niche in relation to these competitor courses.
- From website-based information, the SEES appears as just one of a large number of postgraduate courses, operating in the area of sustainability and overlapping industry sectors, offering a similar set of skills via taught course elements and research training.

Institutional requirements for chartered status

Information has been assembled on the requirements for achieving chartered status from the Engineering Council and its Professional Engineering Institutions (PEIs: CIBSE, CIWEM, EI, IChemE, ICE, IET, IMechE and IStructE) along with the IEMA. This is presented below specifically as it relates to sustainability and to those taking EngDs.

- Examining the institutions' websites reveals that most provide little information about the specific skills that they are seeking from candidates for chartered status.
- Such skills are typically alluded to indirectly through the forms of undergraduate and postgraduate courses that are deemed to meet their professional development requirements.
- The experience sought by the Engineering Council and its PEIs takes the form of professional development that generally takes places in the working environment, building on knowledge and understanding acquired from education.
- It can, for instance, derive from work-based degree programmes.
- Only the IChemE explicitly acknowledges that one year of a completed EngD can contribute to the evidence of four years working in an environment where a prospective CEng candidate will have been using chemical engineering principles.

- The Engineering Council published its UK Standards for Professional Engineering Competence in 2003: this makes reference in section E3 to a competence “to undertake engineering activities in a way that contributes to sustainable development” and lists the skills – such as ‘understand and encourage stakeholder involvement’ and ‘carry out environmental impact assessments’ required for this.
- The Engineering Council has also issued Guidance on Sustainability for the Engineering Professions which makes explicit the role of professional engineers in sustainability and elaborates each of the six principles they should seek to practice: it does not directly specify the skills that they will need to do so.
- The IEMA does make direct reference to sustainable development in its statement of the skills required to become a Chartered Environmentalist – such as analysis and evaluation, leadership, sustainable management, and interpersonal skills.
- Completing SEES taught modules makes Research Engineers eligible for Associate membership of the IEMA: chartered status is dependent on an evidence based report of experience supplemented by professional review interview.
- None of the professional institutions map out the specific skills needed for chartered status to the level of detail, or in a form, that maps directly on to how skill acquisition is described on the websites for IDCs and professional doctorates.

Conclusions and recommendations

The CES requested that the market review address a specific questions set at two different levels:

- Changes in higher education, and
- Issues specific to the SEES EngD, see introduction.

The conclusions drawn here from the review are offered against the specific questions set by the CES.

Changes in higher education over the next five years

1. *How will changes in UK policy affect HE postgraduate courses in sustainable development? (e.g. student numbers, etc.)*

Although postgraduate education has grown sharply, mainly through expanded recruitment of overseas students, the 2010 Browne Review has noted that it is possible that, in future, if students are paying higher fees to enter postgraduate education, they will be less likely to participate because of debts incurred on undergraduate courses. However it seems the Review deemed this unlikely since it concluded that there is no evidence that changes to the funding of student finance are needed to support student demand or access to postgraduate education. The NUS has criticised this analysis as complacent since its own 2010 survey suggests that (personal) finance is already a significant barrier to postgraduate access.

How this debate relates to willingness of potential candidates to undertake an *industrially-sponsored*, work-based postgraduate course is not evident. Should the CES plan for a diminishing market due to higher undergraduate debt, especially since it recruits from within the UK and not overseas? Or does industrial-sponsorship make the course more immune than other forms of postgraduate education to levels of graduate debt - but more vulnerable to the peaks and troughs of the economy? This review cannot answer such questions. These issues require further examination, either through interrogation of prospective students or by tapping into the collective understanding of the alumni and their sponsors.

The 2010 One Step Beyond Review on making the most of postgraduate education recognised the growth over the past 20 years in the provision of professional doctorates and

recommended that HEIs work with Research Councils to develop more multi-disciplinary Doctoral Training Centres. The RCUK has backed this recommendation.

The EPSRC's 2007 review of its Engineering Doctoral Programme recommended its extension. As a result, there are now 19 Industrial Doctorate Centres, some (such as SEES) continuations of previous EngDs. This increase in IDCs and the growth in other forms of professional doctorates, especially in Million+ HEIs, means the SEES now faces increased competition for students, particular where competitor courses recruit from the same industry sectors, see below.

A UUK 2010 report has illustrated the growth in private sector provision in HE, including postgraduate courses. None of the 'case study' examples given in the report map directly on SEES's industry sectors. But one of the providers cited (UWIC validating the Centre for Alternative Technology) is already offering a professional doctorate in one of the sectors (construction) from which the Environmental Technology EngD recruited extensively.

All of these developments mean that, over the next 5 to 10 years, the SEES should expect to see increased competition from both public and private sector provision. This increased competition is particularly important because the SEES currently lacks a unique selling point even in relation to its existing competitors, see below.

2. *How much interest is there from UK employers in courses on sustainable development, and is this expected to grow?*

Our review of the job advertisements in the environmental/sustainability sector set out to identify what skills and experience sets employers are explicitly looking for. We found that specialist knowledge in the field relevant to the job is a requirement of almost all recruiters. The other most commonly asked for skills are project management and communication skills, both written and verbal.

An interest in and knowledge of sustainability is also very commonly required for these jobs, although not all specifically ask for it. Leadership and team-working skills are also commonly asked for. In terms of experience, most recruiters ask for experience in the relevant field (although only one specifies exactly how many years of experience are required). None of the job advertisements we examined requires research skills.

We also carried out five telephone interviews with large employers of postgraduate students, all of whom employ people that have completed EngDs. To summarise, a majority of these employers say they are looking for skills relating to:

- Environmental legislation
- Ability to work as self-starters
- Ability to get on with others, and
- Communication skills.

As to the question of whether interest in courses on sustainable development is set to grow, there is almost no data available on long-term trends in recruitment from sustainability courses. However, in the short-term there is significant evidence that fewer employers will recruit staff with skills in sustainability because of the Comprehensive Spending Review. This means that many government agencies that have in the past recruited postgraduate students from such courses are very unlikely to recruit in the next two years – Natural England, for example, has announced that it has ceased all recruitment.

Questions specific to the Eng D:

- a) *Are there specific bodies or learned societies the University should persuade to accredit the EngD (e.g. IEMA, who already accredits the taught programme; Institute of Biology)?*

The IChemE already acknowledges that one year of a completed EngD can be counted towards the four years work experience it requires for CEng status, given appropriate

course content. Apart from the IEMA, it is not apparent to prospective SEES students (from either the SEES's own website or from the websites of the Engineering Council and other PEIs) that the EngD contributes to them attaining chartered status. It would be very desirable to establish the EngD as a contribution to achieving chartered status for relevant engineering professions. Further negotiations with the Engineering Council and its relevant PEIs are required on this issue, leading to more explicit information on the SEES website.

b) What competing courses are on offer in the UK?

The review has identified 14 other IDCs and Professional Doctorate courses, serving the construction, energy, engineering, environment, water and transport sectors, that appear to compete directly with the SEES for recruitment of students. The recommendation of the Open Step Beyond Review, and the RCUK's endorsement of this, means that the number of competitor courses funded by research councils is likely to grow. Over the next 5-10 years, the UUK's report suggests that there is also likely to significant growth in private sector provision of postgraduate education (with taught elements), possibly in-house within large corporate organisations or with specific occupational regulatory associations.

c) What are the EngD's 'unique selling points'?

At present, the SEES's sole USP would appear to be that it offers a module in risk assessment. Instead the SEES shares with the other IDCs and professional doctorates a broad set of first and second order skill sets. This means that the SEES does not have a differentiated niche position in the market place. Developing such a niche position would itself be a USP that enabled the SEES to distinguish itself from the shared offer (overlapping skill sets) of its 14 direct competitor courses.

d) Are there gaps in the market for postgraduate courses that Surrey could exploit?

There are no obvious gaps in the market that can be discerned from examining the requirements for chartered status of relevant professional institutions.

Nor are there obvious gaps emerging from our interviews with employers or university careers advisors.