Securing

Engineering Construction Skills

for the Future

Securing Engineering Construction Skills for the Future

Contents

Securing Engineering Construction Skills for the Future

Introduction & Invitation

This paper, ***Securing Engineering Construction Skills for the Future***, follows on from ***Bridging the Skills Gap,*** the ECITB's briefing paper that was published in September 2007. There has been widespread discussion amongst Engineering Construction employers, their Clients, Employer Associations and the Trades Unions that are key stakeholders in and central to the future of Engineering Construction as a thriving industry.

The feedback has been tremendous. The overall message is clear - the industry stakeholders must work together now to raise the skills of the existing workforce and bring in more people with the right training and skills to meet demand.

By 2014, under the existing training levy arrangements, the ECITB's plan will deliver 14,000 people into the industry against a projected need of 31,000. This leaves a 17,000 shortfall.

Our goal now is to focus the discussion on how to take the opportunity to overcome this shortfall and secure the future skills for Engineering Construction.

We have the ambition and drive to create a skills plan for Engineering Construction that brings Employers, Government and other stakeholders together in a partnership to deliver the right skills, at the right time and in the best ways possible.

This paper is the next step in the process and consultation will run until July 2008. There will then be further work to refine the action plan, after which it will be put to Government, Employers, Clients and Trades Unions for confirmation of their commitment and support so that implementation can begin in 2009 and beyond.

All stakeholders and everyone with a personal interest are invited to contribute to the process and shape the plan for the future via the website www.ecitb.org.uk, or e-mail to consultation@ecitb.org.uk. You can also register your interest to participate in our regional forums by e-mailing forums@ecitb.org.uk.

Conclusions & Recommendations

It is clear that unless there is urgent and sustained action to increase the number and quality of people in the strategically important Engineering Construction Industry there is increasing risk to our ability to both build and maintain the industrial facilities that support large parts of the economy. Labour costs are already rising and there is growing evidence that capital investment is being deferred because of the lack of sufficiently skilled personnel.

The skills shortages are most prevalent in the skilled mechanical and electrical discipline areas in plant repair and maintenance and new construction and, importantly, in the project engineering, design and project management skills.

Securing these skills for a successful Engineering Construction Industry will bring enormous benefit to the UK economy by ensuring that we remain a highly productive, leading industry, competitive at European and World levels.

It is in everyone's interest, Employers, Clients and Government to have a competitive, sustainable UK skills pool that is less dependent on skills from overseas. Taking the opportunity to raise the skill levels in the industry and improve productivity will help to secure sustained investment in maintaining and building new industrial plant and equipment that is essential for the energy and power we need, valuable chemicals, plastics and pharmaceuticals we use, food we consume, the water we drink and sewerage we treat.

By working together in a strategic and planned way now, to increase the available UK skills pool, we have the potential to control the rising costs of the industry and increase the number and share of jobs available to UK workers. We will then retain our current position as a world leading centre of Engineering Construction expertise and be able to grow export earnings.

Context & Scale of the Challenge

The overwhelming consensus is that the industry has passed a critical point. Real growth in capital investment from Clients is driving the need for more people in on-site repair and maintenance, new plant building programmes and decommissioning of old facilities.

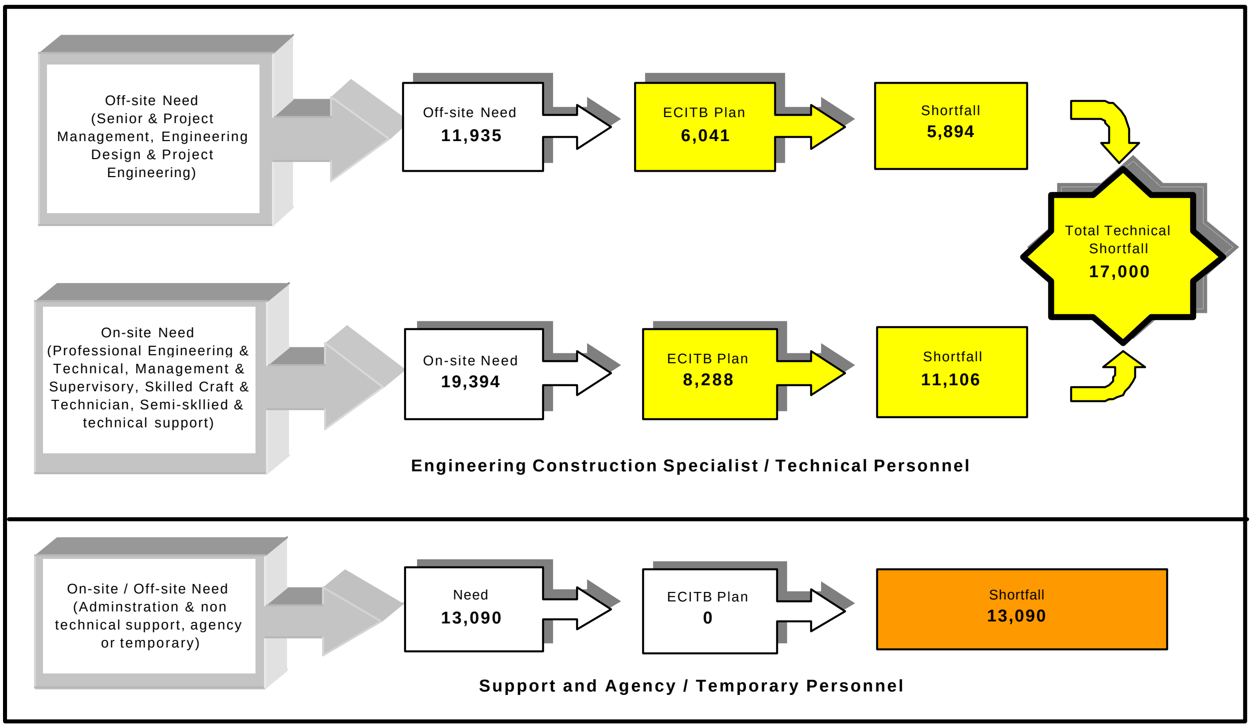
There is an acute shortage of suitably qualified people in the UK workforce that is worsened by the rate of people retiring or otherwise leaving the industry.

The energy and power sectors are experiencing particularly strong demand now and it will rise further as new power stations are built to replace the old coal and nuclear stations.
The international Engineering Construction market is also buoyant and expected to remain so, affecting the UK based engineering, design and procurement contractors (off-site). They are currently reporting ~3,000 unfilled vacancies in key engineering, technical and project management roles.

In the UK, the available Engineering Construction skills pool is not meeting the current need. Whilst importation of skilled people from Europe and further afield is meeting some of the skills shortages at the moment, the consensus is that these people will not be available in the same numbers in the medium term. Competition for Engineering Construction skills is increasing as a result of Clients increasing their in-house capabilities (after a period of outsourcing) and the Government's ship building programme together likely to take around 20% of the current on-site workforce employed by Engineering Construction contractors.

Furthermore, demand is forecast to rise further at least at 5% per year for the next few years and in some critical areas by as much as 15% in some years. This outlook has led to genuine and growing concerns on the nature and scale of skills for the future. These are being expressed by Contractors, Clients and Trades Unions across the industry.

Figure 1: 2007 – 2014 Cumulative Workforce Requirements



(**Annex 3** provides a more detailed breakdown of the above figures.)

POWER GENERATION FOCUS

There is a growing skills shortage in the power generation sector due to the demand associated with new power plant – renewable energy, gas, nuclear and coal – on top of the growing demand for repair and maintenance of existing facilities.

According to the UK Energy White Paper 2007, there is a need for approximately 30-35GW of new power generation capacity by 2025. Some 20GW is needed by 2016 to replace nuclear and coal plants which are scheduled to close by then.

The New Build programme will require an increase in the UK engineering construction work force, both on-site and off-site, of around 5,000 by 2014. The precise structure of skills and the distribution of employment across the industry will be dependent on the mix of renewable energy schemes, gas, nuclear and coal, and there is a great commonality in the skills used in these areas.

The ECITB's role & contribution

There are distinct areas of action and challenge that the ECITB is focused on:

1. Increasing the flow of people into and increasing the capability of the people who spend most of their time working ***on-site***. These are mainly craft, technician, supervisory and construction management roles, supported by engineering and project management personnel:

   - Apprenticeships in craft and technical skills (new entrant)
   - Up-skilling and modular conversion training for craft and technician skills (existing and new entrant)
   - Up-skilling and modular development programmes for supervisory personnel (existing)
   - Up-skilling and modular development of site construction management personnel (existing and new entrant)
   - Up-skilling and modular development of project management personnel (existing).

2. Increasing the flow of people into and increasing the capability of the people who spend most of their time off-site designing, planning and managing the construction and maintenance projects. These are mainly, technical, engineering and professional engineering, project and project management roles, supported by contract, procurement management and project control personnel

   - Apprenticeships and up-skilling in engineering design (new entrant and existing)
   - Apprenticeships and up-skilling (modular) in project control (new entrant and existing)
   - Up-skilling and modular development of project management personnel (existing)
   - Graduate entrant development programme to up-skill and progress to professional recognition (entrant and existing).

Annexes 1 and 2 give a further analysis of the profiles and projected numbers of people by skill area for the on-site and off-site workforces respectively.

Annexes 3 and 4, (and Figure 1 above) show the ECITB planned and sustainable contribution to meeting the skills challenge between now and 2014. This will be over 14,000 people across the skills mix and assumed the current balance of expenditure between new entrant (apprentice mainly) and up-skilling programmes. Importantly it assumes no change to the training levy arrangements.

Whilst 14,000 people is a major contribution, it will not even match the expected number of retirees and other leavers who are being lost to the industry at the rate of ~6% each year. The consensus is that an average growth of 5% each year is likely and this will mean an **additional** 17,000 technical people will be needed to meet demand. Even if growth is only in line with general economic growth of around 2% then an additional 8,500 over and above the ECITB's contribution will be required.

This leads to only one conclusion that additional investment beyond the current employer own and ECITB training levy resources is needed to meet demand. The question is how best to do this and share the investment equitably across the industry?

The analysis at **Annex** 5 shows a comparison between the 2007 profile of Engineering Construction industry by sector and the projected position for 2014. **Annexes** 6 and 7 show the breakdown between repair, new build and dismantling activity by sector for 2007 and 2014.

Risks and Potential Roadblocks

1. The greatest risk is in not taking action urgently or coherently. Delayed or fragmented action will not maximise the effectiveness and efficiency of the training and delivery system and we will fail to deliver a robust and competitive workforce for the industry.
2. The principal roadblock to developing the on-site craft and technician workforce, given the well developed network of ECITB accredited providers, is Employers' uncertainty regarding future levels of work from Clients. Commitment from Clients to take a share of the training burden and provide the required volume of on-site training placements will largely remove this roadblock.
3. The industry could consider different entry level qualifications and career starting points for craft and technician personnel on-site. The current preferred entry qualification at VQ3, most often delivered through a well developed ECITB Advanced/Modern Apprenticeship, requires 3-5 years before full competence is achieved. It is mainly linked to college academic years and this often does not match work patterns and gives bulges of output in the Autumn, which is past the Summer peak of seasonal work.
4. More flexibility in training delivery is possible once a critical volume in a region or discipline is reached. Cooperation amongst Clients and Employers has been proven to help this. Also, a willingness from all stakeholders, Clients, Employers and Trades Unions to allow different entry points and then support further progression may assist in smoothing the training demand in to a more easily managed system. Some building blocks are there.
5. The fragmented and non-uniform funding arrangements between the Nations for support for apprenticeships and (in England) Train to Gain make it difficult for Employers and providers. Valuable time and effort is spent in attempting to understand the different systems. The industry already benefits from the ECITB, giving a focus and an effective vehicle for orchestrating the industry's training in a coherent plan. Channelling additional resources via the ECITB has the potential to greatly simplify the whole system.
6. In the short term, the potential recruitment pool for graduate entrants is already fixed for at least the next three years and so Engineering Construction must capture its fair share of the good people graduating. Up-skilling programmes will be needed for these people very quickly to get them up to standard. In the future, more undergraduate places in programmes relevant to Engineering Construction, followed by rapid up-skilling will help to ensure sufficient quality people. The number of training places and the ability of Employers to provide sufficient in-house mentors will be a potential blockage. "Train the trainer" will help to build capacity.
7. the availability of mature entrants with appropriate skills and attitude is a cause for concern. There are pockets of potential recruits who are unemployed or in disadvantaged groups. Whilst there is a willingness to train these people, they often need preparatory training. If this was provided, and additional support given for up-skilling, these people could be offered career opportunities that are currently being denied them.
8. All of these risks can be overcome with sustained action until 2014 at least. This will overcome the initial step change in of training required. Thereafter, provided there is continued collective and coordinated action by all stakeholders, the industry will be more balanced and largely self sustaining.

March 2008

Annex 1: On-site - construction, repair and maintenance

The table below shows the 2007 known population of people by skills category, the projected population by 2014 based on expected growth rates. The Average annual need is the aggregate number of people required to meet the anticipated growth and to replace leavers.

Skill Category	2007 Population	Average annual need	Total need to 2014	2014 Population
Professional Engineering and Technical	4,000	440	3,224	5,400
Management & Supervisory	2,000	220	1,540	2,700
Skilled Craft & Technician	15,000	1,650	11,550	20,250
Semi-skilled & technical support	4,000	440	3,080	5,400
Agency or temporary	5,000	550	3,850	7,450
Total on-site workforce	30,000	3,300	23,244	41,200

Table 1: Analysis of the On-site workforce by skill area, showing Annual and Total needs for personnel to 2014 and the population profile in 2014

The on-site workforce currently comprises a core of 15,000 skilled craft and technician personnel (typically VQ3 or equivalent), 2,000 supervisory personnel, 4,000 semi-skilled (VQ2 or equivalent) and 4,000 engineering and project management personnel. This gives a core of 25,000 people.

Additionally there is an estimated further 5,000 people across the skills mix who are employed on a floating, temporary basis and are highly mobile between employers and projects. This population typically works in Engineering Construction during plant shut downs and overhauls, moving from job to job. It is also in decline, and probably at a faster rate than the core workforce.

A total of 1,800 people leave the industry each year. Many are retiring and some leave to competing sectors where work is more stable. There are some signs that people are working beyond 65 which slows the leaving rate slightly, but often these people have skills gaps and will require re-skilling.

With increasing investment in energy and other industrial processing plants, estimates show that an additional 1,500 skilled people are needed per year to fulfil demand. Therefore the total annual requirement for new people to work on-site is 3,300.

The market is currently failing to supply this demand and employment costs are rising rapidly in some disciplines. There is increasing evidence of poaching and European sources are becoming more difficult to access. The skills market is “overheating”.

The overall conclusion is that between 2008 and 2014, around 23,000 additional people will need to be recruited and/or trained to meet the anticipated demand for skilled people, an average of ~3,300 more people each year.

Annex 2: Off-site - design, engineering, project management

he table below shows the 2007 known population of people by skills category, the projected population by 2014 based on expected growth rates. The Average annual need is the aggregate number of people required to meet the anticipated growth and to replace leavers.

Skill Category	2007 Population	Average annual need	Total need to 2014	2014 Population
Senior Management & Project Management	3,500	385	2,695	4,165
Engineering Design & Project Engineering	12,000	1,320	9,240	17,040
Administration & non technical support	7,000	770	5,390	9,450
Agency or temporary	5,000	550	3,850	7,450
Total off-site workforce	27,500	3,025	21,175	38,105

Table 2: Analysis of the Off-site workforce by skill area, showing Annual and Total needs for personnel to 2014 and the population profile in 2014

In Engineering Construction, off-site is a term used to describe the engineering and process design, project planning, procurement and project management activities that are essential before and during on-site construction and maintenance work. Many companies do this in addition to site based activities, whilst some companies specialise in this important skill area.

Whilst the skills profile is different, requiring proportionally more professionally qualified engineering graduates and technical personnel, many of the characteristics of the on-site workforce also apply off-site: there is a skewed age profile, agency or temporary workers are used, skills shortages are being experienced now and are forecast to worsen, although some softening of growth is expected beyond 2012.

These factors have been factored into the analysis which shows that a sustained annual need for people is ~3,025 each year of which 2,255 (75%) are in the engineering, technical and project management specialisms.

It is important to recognise that for many of the major off-site contractors, most of their current work is for sites and plant outside of the UK and the future demand should be considered in this context. It is likely that a significant share of the demand growth will be met by transferring the work to centres overseas that themselves are growing.

A concern is that if this trend continues unabated, then the UK's capability to engineer and manage projects will reduce to a point where it loses market share and the current significant export earnings from this sector are reduced.

Annex 3: Analysis of Off-site and On-site Skills needs, ECITB outcomes and Shortfalls

Off-site Skill Category	2007 Population	Average annual need	Total need to 2014	2014 Population	ECITB Plan	Shortfall
Senior Management & Project Management	3,500	385	2,695	4,165	1,232	1,463
Engineering Design & Project Engineering	12,000	1,320	9,240	17,040	4,809	4,431
Administration & non technical support	7,000	770	5,390	9,450	0	5,390
Agency or temporary	5,000	550	3,850	7,450	0	3,850
Total off-site workforce	27,500	3,025	21,175	38,105	**6,041**	**15,134**

5,894

On-site Skill Category	2007 Population	Average annual need	Total need to 2014	2014 Population	ECITB Plan	Shortfall
Professional Engineering and Technical	4,000	440	3,224	5,400	798	2,426
Management & Supervisory	2,000	220	1,540	2,700	1,540	0
Skilled Craft & Technician	15,000	1,650	11,550	20,250	3,500	8,050
Semi-skilled & technical support	4,000	440	3,080	5,400	2,450	630
Agency or temporary	5,000	550	3,850	7,450	0	3,850
Total on-site workforce	30,000	3,300	23,244	41,200	**8,288**	**14,956**

11,106

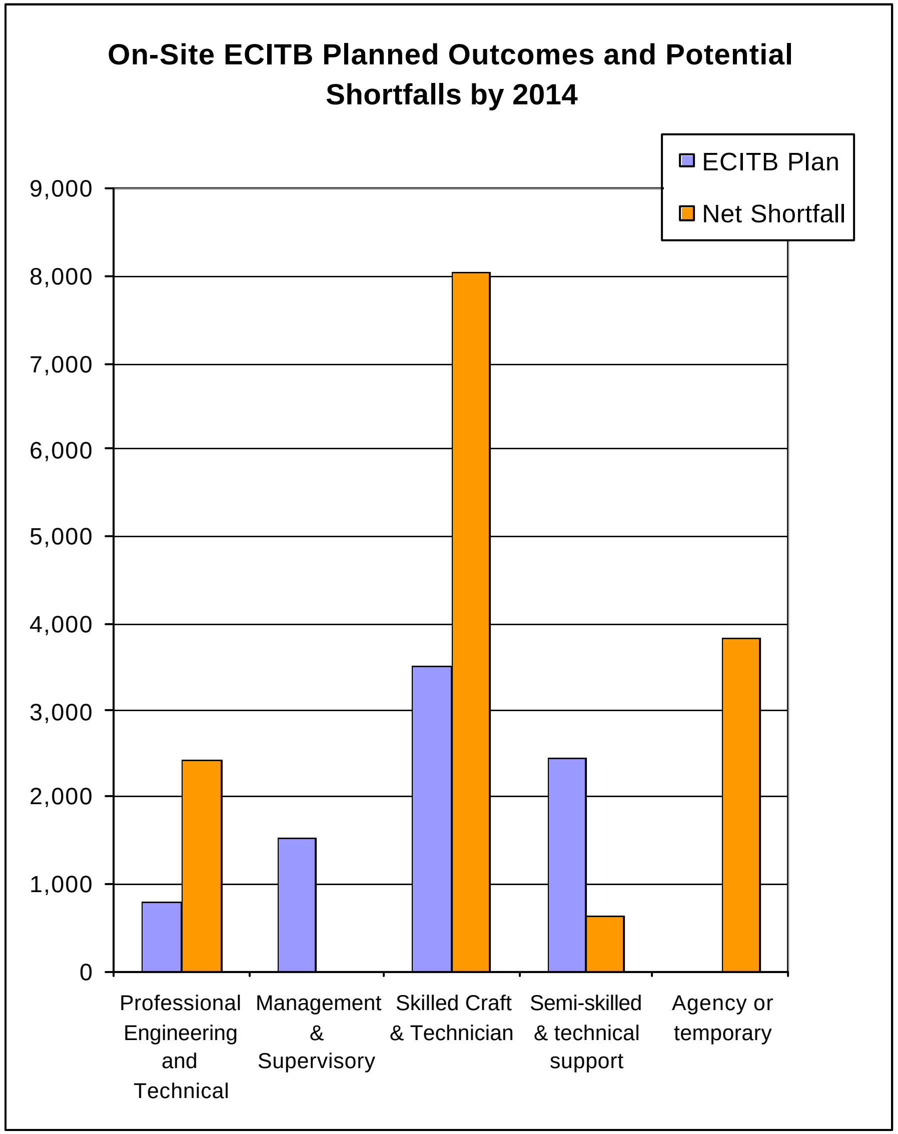
17,000	Total Shortfalls	**13,090**

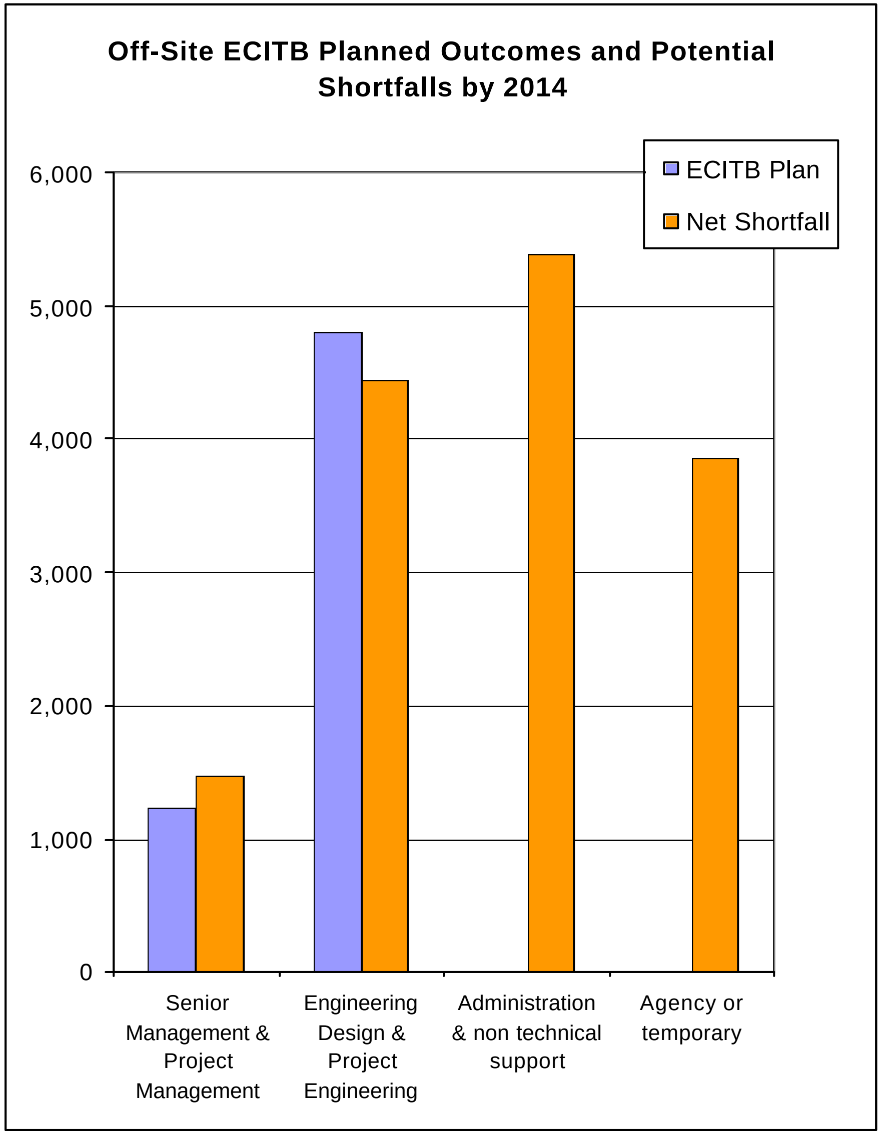
Key

Supported by ECITB

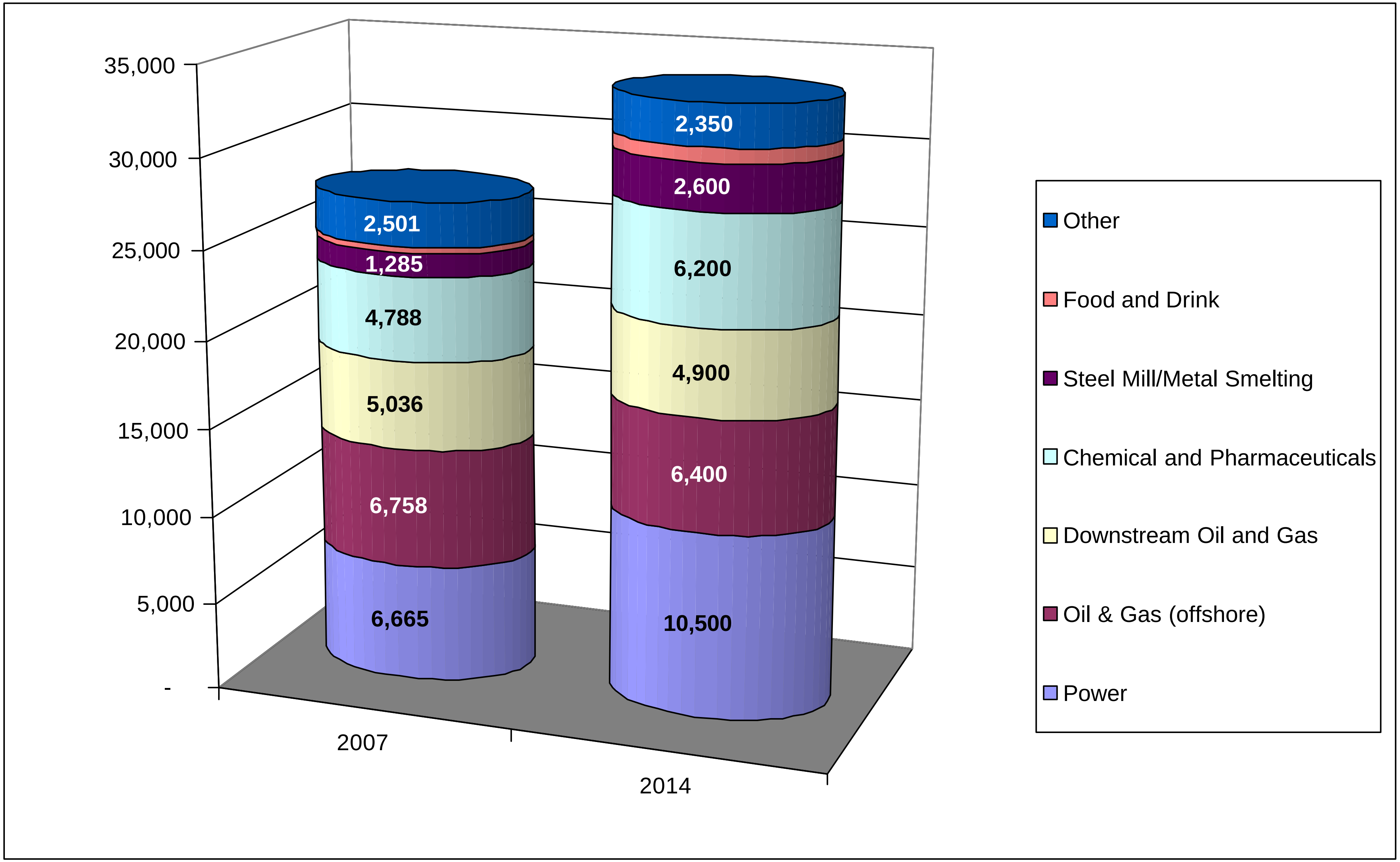
Outside ECITB Programmes

Annex 4: Graphs of ECITB Planned Outcomes and Shortfalls

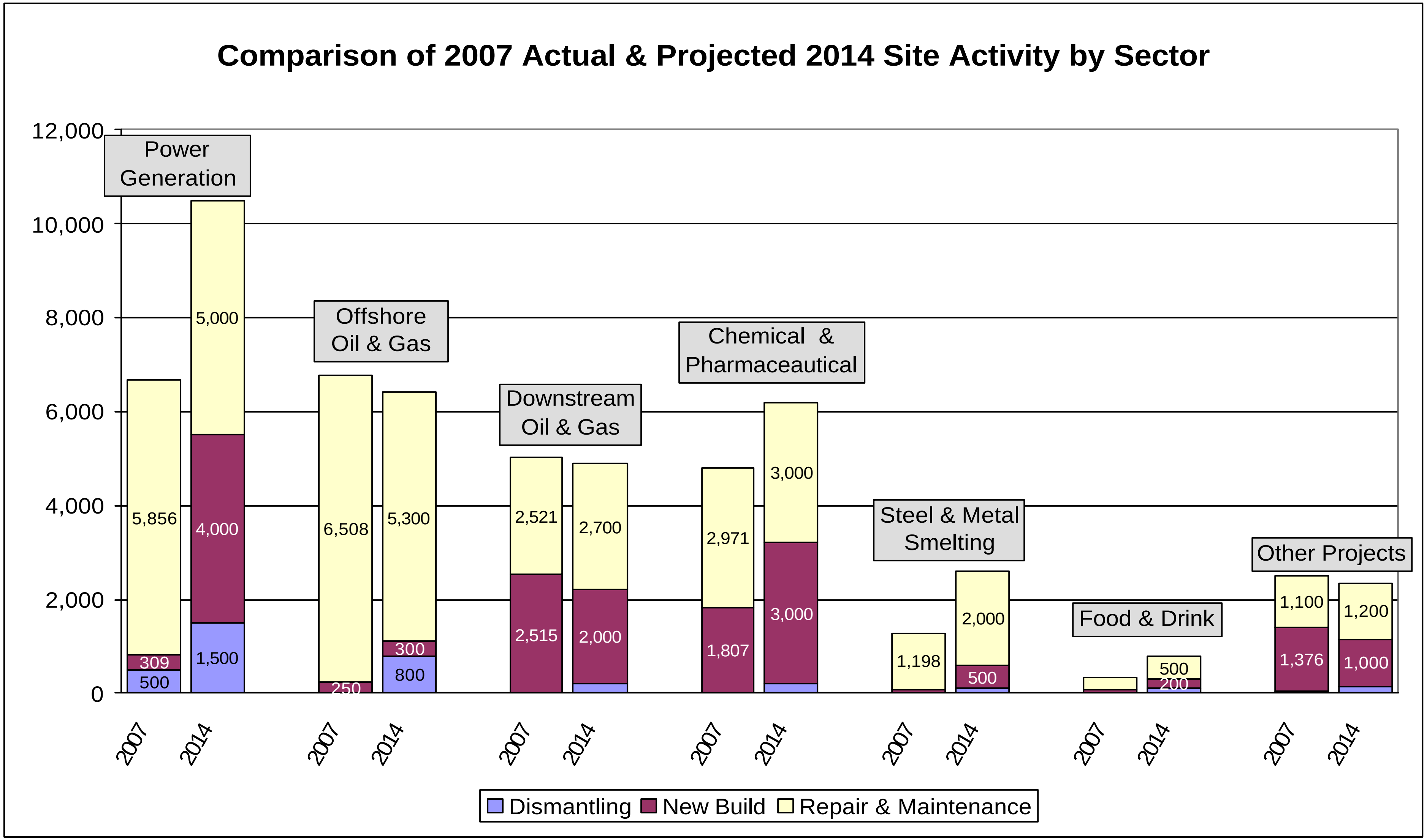




Annex 5: Analysis of UK Total On-site Manpower by Sector: 2007 actual figures and 2014 projected



Annex 6: Comparison of 2007Actual & 2014 projected On-Site Manpower for Repair, New Build and Dismantling



Annex 7: The historical perspective - why we are where we are

There are some potentially valuable lessons from the industry's past as today we are experiencing some of the same issues that were faced around 30 years ago.

Engineering Construction emerged as a discrete activity in the 1960-70s when there was a great deal of investment in major power station, oil refinery and chemical plant and the new industry of oil and gas production from the North Sea. The capital investment then was on a massive scale and happened quite quickly. There were difficulties that were highlighted in government reports at the time where projects ran very late and cost much more than originally planned. Virtually all of these projects were important to the UK economy.

A significant factor was poor industrial relations that exacerbated management failings and contributed to cost increases. There were skills shortages, wage inflation and importation of personnel from overseas in attempts to solve the problems with some successes but also many failures.

Around this time, training of people increased dramatically and a large pool of people began to be created. Heavy manufacturing and shipbuilding industries were useful pools of skilled people and there was a high degree of sharing the skilled workers and industrial relations were stabilised by collective national agreements for engineering construction.

Work levels reached a peak in the 1980s, then suffered a downturn before reaching a second peak around 1990-95. They then declined further until around 2004/5. We are now experiencing an upturn because of increasing oil prices, the need to control carbon emissions and, most importantly, the UK electricity industry needs to replace or upgrade the vast majority of its coal and nuclear powered stations.

There are striking similarities with the market conditions in the industry today as the capital investment levels are rising and there are too few people readily available to meet the need. Whilst the industrial relations structures remain largely in place today, they have come under increasing pressure in the last five years as the levels of capital investment have increased at the time of skills shortages.

Importation of people from the EU and elsewhere has eased some of the issues but is not believed sustainable going forwards.

There are also some very important differences. With the decline of heavy engineering, manufacturing and large shipbuilding there is overall a smaller pool than previously of people with relevant skills. It is believed strategically important for the country to increase the size of this critical skills pool.

Also, capital investors (eg power generators) are much more diverse following the UK's round of privatisations and the break up of major industrial companies. This means that it is more difficult to get coherence of action and voluntary cooperation as happened previously. Strategic direction and support from the Government is necessary to bring coherence.

Kings Langley, Hertfordshire, WD4 8JP

www.ecitb.org.uk

tel: 01923 260000

fax: 01923 270969