



Engineering Professors' Council response to the Welsh Government call for evidence: The future of tertiary education in Wales

1. About the EPC

The Engineering Professors' Council (EPC) is the representative body for engineering academics in UK higher education. There are currently 86 institutional members encompassing around 8,000 academic staff. Our membership typically covers around 90% of HE engineering students in Wales (and varies year on year based on financial constraints).

2. Executive summary

The EPC welcomes the Welsh Government's call for evidence and the strategic direction set out in the evidence paper accompanying the development of the new tertiary system under Medr.

3. Key recommendations

- **Designate engineering as a strategic subject priority** within Welsh tertiary planning frameworks.
- **Advancement of engineering skills** development to support **engineering career pathways**, to support skills pipeline from **Level 2 to Level 7 qualifications** in engineering and to ensure **engineering talent in Wales**.

- **Introduce discipline-sensitive funding mechanisms** that reflect the true delivery costs of engineering education. This could be addressed through **high-cost discipline funding**.
- **Provide stable capital investment in individual and shared laboratories and technical infrastructure** and **protect capital investment to maintain** laboratories, equipment and technical infrastructure.
- **Empower Medr to coordinate and incentivise geographically balanced provision**, preventing regional cold spots in engineering education. Levers for this should include **financial support and transport logistics**.
- **Avoid implementing an international student levy similar to that proposed in England**, which could destabilise engineering departments reliant on postgraduate international enrolments.
- **Align engineering education provision with Wales's industrial strategy and net zero priorities including:**
 - **Expanding and adequately funding degree apprenticeships and flexible entry routes** into engineering.
 - **Expanding employer partnerships and placement capacity** within engineering programmes.
 - **Sustaining and expanding engineering research and development funding**, recognising its importance for regional innovation ecosystems.
 - Supporting **degree apprenticeships and industry partnerships** that directly link education with economic demand.
- **Strengthen FE-to-HE progression pathways** into accredited engineering degrees.
- **Address the mathematics pipeline challenge**, particularly at Key Stages 2–3.
- **Invest in modular and stackable engineering qualifications** to support lifelong learning and workforce transitions.
- **Ensure equitable funding support for adult learners**, including part-time and returning students.
- **Address the lack of opportunity to study in Welsh language**, explicitly:
 - Science at Key Stage 4.
 - Engineering at Levels 2 to 7.

4. Introduction

The Welsh Government's evidence call represents an important opportunity to shape the future structure of tertiary education in Wales. However, a strategic approach to the future of tertiary education in Wales requires an understanding beyond the micro-level insights invited in the response form to this consultation.

Engineering is a strategically critical discipline that underpins Wales's economic ambitions, industrial capabilities, major capital projects and infrastructure resilience. However, engineering provision also faces distinctive structural pressures arising from high delivery costs, demographic change (falling pre-16 students in Wales), and reliance on international postgraduate recruitment.

A successful tertiary system must therefore incorporate subject-sensitive policy frameworks that recognise the unique characteristics of engineering education.

By designating engineering as a strategic subject, introducing discipline-sensitive funding, and strengthening collaboration across the tertiary sector, Wales can safeguard the engineering capacity needed to support long-term economic growth and national resilience.

5. Approach

The EPC responses below are shaped by the five challenges outlined in the consultation, but with financial sustainability as the critical tier upon which mitigation of other risks and realisation of opportunities depend. We also highlight the importance of professional standards to any quality and standards regime.

6. Financial sustainability

Engineering programmes are structurally expensive to deliver. Costs arise from laboratories, specialist equipment, safety requirements, technical staff, and lower student-to-staff ratios required for high-quality teaching.

Current funding mechanisms do not sufficiently recognise these costs. The EPC have estimated this shortfall at an average of £7,591 per English student per year across Engineering (higher in General Engineering) in 2023/24. This includes adjustments for the high-cost funding uplift for institutions delivering strategically important subjects. However, Welsh subsidy rates for Science, engineering and technology fall below those in both England and Scotland. The situation in Wales is, therefore, even more dire.

As a result, engineering provision is often cross-subsidised by lower-cost disciplines.

This existential cross-subsidy model in engineering is increasingly unsustainable given wider financial pressures on universities.

Engineering departments in Wales (and elsewhere in the UK) are also heavily reliant on international postgraduate enrolments (as shown in Medr's recent strategic subject review). Around four-fifths of taught postgraduate engineering students at Welsh institutions come from overseas. While international recruitment is valuable, this reliance creates exposure to global market conditions and visa policy changes.

Without **adequate discipline-sensitive funding mechanisms, strategic investment and stable capital investment, institutions may be forced to rationalise high-cost programmes, including engineering**. Course reductions or closures will have knock-on effects for skills supply, and such outcomes would weaken Wales's ability to meet its future skills needs.

Funding mechanisms should recognise these cost pressures rather than rely on blunt volume or participation metrics. Wales cannot meet future skills needs if engineering is treated as financially equivalent to low-cost classroom subjects.

Efficiency in course delivery and cost savings

Engineering teaching is **significantly more expensive** to deliver than many other subjects due to significant investment in laboratories, specialist equipment, safety infrastructure and low student-to-student scaling effects.

While institutions continually seek efficiencies, the scope for cost reductions without compromising high engineering course quality is limited. Evidence shows that engineering has almost universally good employment outcomes across all providers and, unlike many subject areas, it is often a key strength in institutions that aren't traditionally at the top of league tables. That's partly because engineering has better ties to industry than most courses and engineering firms are often found away from traditional economic hubs.

We must avoid a race to the bottom in course cost-cutting that undermines accreditation and quality.

Engineering education is closely linked to professional accreditation through bodies recognised by the Engineering Council and the wider engineering profession. Accreditation plays a critical role in ensuring programme quality, graduate employability and international recognition of engineering qualifications.

Wales must avoid regulatory or funding incentives that unintentionally weaken accredited provision and care should be taken to avoid anything that might pose a barrier to future accreditation, including funding constraints.

Regulatory and quality frameworks within the tertiary system should respect discipline-specific requirements and avoid imposing generic metrics that may unintentionally distort engineering education. Quality measures should also support **innovation** – which is essential in engineering – not penalise the complexity inherent in engineering programmes.

Sector collaboration to manage complexity and high-cost delivery in engineering is paramount, but this is more than efficiency gains through shared infrastructure. These approaches require coordination at a system level.

Medr's recent strategic subject review also identified workforce and technical staff shortages as a serious long-term risk. Engineering depends on skilled technical staff and lab infrastructure, and Wales needs workforce planning not only for lecturers, but also for technicians and specialist support roles. Financial pressures on engineering are creating a culture of restructuring and redundancies, and this is a short-sighted approach.

Recommendation:

1. Enable workforce planning that recognises that technician and specialist staffing are under pressure this fact and embeds it in tertiary reform.

Cost barriers for learners

Engineering students have higher contact hours than for almost any other subject. Part-time paid work is shown to have a detrimental effect on studies, and this is likely to be exacerbated in Engineering.

Financial support frameworks should take study intensity factors into account. Medr should ensure student maintenance support does not disadvantage high-contact, high-placement subjects (engineering placements can create additional costs).

Priorities for public investment

Current funding approaches do not adequately reflect the cost of delivering engineering programmes. Engineering learning environments come with high fixed costs which themselves need to remain fairly static to ensure the equipment is maintained and accessible to all students for a high-quality experience.

The continued reliance on incremental cost-cutting across Wales poses a profound risk to the long-term sustainability of strategically vital disciplines. Fields essential to national security and defence, including aeronautical and aerospace engineering as well as aircraft maintenance, have been under acute pressure. Several of these programmes are no longer delivered regionally and, in the case of aircraft maintenance, provision now rests with only two national providers: one in Wales and one in England, both facing significant threat. While some Russell Group institutions are better

positioned to absorb current financial shocks, Wales stands to lose entire capability areas that are fundamental to economic resilience, sovereign capacity and security preparedness. Without a holistic, coordinated and forward-looking regulatory and funding approach, the nation risks irretrievably hollowing out the skills base required to meet both current and future strategic needs.

Without discipline-sensitive funding mechanisms, institutions may reduce provision in high-cost STEM subjects – in particular engineering – resulting in significant capacity gaps in disciplines vital to national infrastructure. Public investment should reflect these needs.

Recommendations:

2. Introduce explicit **high-cost subject funding uplifts** for engineering.
3. Ensure funding models **recognise the full delivery costs** of laboratory-based disciplines.
4. Consider **targeted funding** for strategically essential engineering disciplines where provision is fragile.

Capital investment priorities

Laboratory infrastructure and equipment require continuous renewal. Sustained capital investment is therefore essential to maintain engineering education capacity.

Recommendation:

5. **Protect capital investment budgets** for teaching labs and technical infrastructure development and maintenance

7. Participation and demand

Engineering is highlighted as a significant component of the Welsh higher education subject mix in the recent Strategic HE Subject Review, which shows that engineering enrolments are substantial, particularly at full-time undergraduate level.

However, headline enrolment figures do not fully capture structural risks in engineering provision. Engineering isn't currently identified as one of the *most vulnerable* subjects on simple supply-demand mismatches – at least in the indicators published so far – and this may be a medium to long term oversight.

It is acknowledged that engineering provision is geographically concentrated within Wales, particularly in South West Wales. This distribution may limit access in other regions and contribute to cross-border student flows, with Welsh learners choosing to study engineering elsewhere in the UK.

Recommendation:

6. **Undertake more detailed and longer term subject level analysis to recognise the heterogeneity with and breadth of engineering** as a discipline and the more specific subject cold spots in Wales.

The analysis to date has, however, identified a crucial factor, the complexities of which may not yet be well understood in Government. **A high proportion of engineering postgraduate enrolments at Welsh HE providers come from overseas students** (around 79% at taught postgraduate level). This growth in international PGT provision is not accidental. Mounting pressures are well rehearsed and have forced the sector to do more with less for over a decade or more. That engineering departments are among those most dependent on international student fee income reflects how universities have responded to **long-standing underfunding of high-cost subjects** where high-quality provision for home engineering students is loss-making. International students – and PGT students, in particular – currently provide a crucial **cross-subsidy** that helps sustain engineering provision at scale, offsetting losses incurred on domestic undergraduate courses (where UK students studying MEng. are typically considered undergraduate).

This reliance on international PGT students and overseas tuition fees renders engineering highly vulnerable to market volatility, heightens financial exposure to global recruitment conditions and exposes demand to visa policy changes.

Recommendation:

7. If international enrolments or institutional capacity in engineering decline in specific regions or institutions, **the Government could consider policy support or incentives to maintain viable domestic provision.**

Engineering education requires specific subject preparation, particularly in mathematics and, in many cases, physics, and participation patterns therefore differ from many other disciplines. Participation is also shaped by the availability of technical progression routes through further education and apprenticeships.

Post-pandemic, increasing numbers of learners are entering FE at Levels 1–2. This suggests gaps in school-level preparation and challenges in the accessibility and suitability of the qualifications framework. If resourced, HE can support clearer, better-integrated pathways to enable progression. **Enrolments at L1–L2 have risen sharply in the valleys alongside increasing additional learning needs** – likely long-term effects of COVID-era disruption. These trends include learners returning to repeat GCSEs/A levels following the centre-assessed grades period.

Participation in engineering also reflects broader equity challenges. Engineering is a discipline where inequalities are particularly persistent (gender, socio-economic

background, disability), and Wales has an opportunity to address this through **system-wide policy rather than isolated initiatives**.

Addressing these disparities will require targeted outreach towards the areas that have the most to gain, improved preparation pathways, and stronger progression routes into engineering degrees. This should include the protection of Foundation Years, which provide prospects for many of lower socio-economic background (see Swansea, for example).

Recommendation:

8. Policy should address **regional access barriers** (travel-to-learn constraints, availability of engineering programmes outside major hubs).
9. **Foundation years in engineering should be protected.**

Backgrounds and pathways of learners entering college on lower-level qualifications

Engineering participation is strongly shaped by the mathematics and physics pipeline. Many learners who might progress into engineering lack access to the subject preparation needed for higher-level engineering study.

Further education colleges therefore play a critical role in preparing learners through technical and applied pathways, but progression routes into accredited engineering degrees remain uneven across Wales.

Policy should recognise that engineering pathways differ from many other disciplines because of the subject preparation required.

Recommendations:

10. FE colleges are crucial to the pipeline and should be supported to provide **strong maths/physics preparation and technical progression routes in Welsh, English and bilingually**.
11. Expand targeted outreach and transition programmes aimed at widening participation in engineering.
12. Strengthen FE-to-HE articulation agreements to support high quality and accredited engineering degrees.

Causes of recent uplift in college enrolments

Recent growth in tertiary participation is likely influenced by demographic fluctuations, labour market uncertainty, and increased interest in technical and vocational education pathways.

For engineering, enrolment patterns are shaped by the availability of viable technical pathways and the capacity of institutions to sustain high-cost provision.

Maintaining engineering participation will require **deliberate policy support rather than reliance on market dynamics alone**.

Higher levels of part-time and mature participation

Engineering has historically attracted fewer part-time undergraduates than many other disciplines, largely because of the laboratory-intensive nature of programmes, contact hours, and accreditation requirements.

However, Wales needs flexible engineering provision to support workforce transitions, therefore the sector will increasingly need flexible routes to support mid-career upskilling and workforce transitions in areas such as digital manufacturing, infrastructure renewal and net-zero technologies.

Engineering employers need **bite-sized upskilling** options, but current systems remain too qualification-bound and inflexible.

Recommendations:

13. Expand **flexible progression routes** for mature entrants into engineering
14. Ensure **part-time learners are not structurally disadvantaged** in funding and student support systems.

Targets for Level 4+ participation and apprenticeships

Targets for tertiary participation should reflect the strategic importance of disciplines that underpin national economic priorities.

Engineering is essential for productivity, infrastructure development and the net-zero transition. Participation targets should therefore explicitly consider workforce demand in engineering and related technical disciplines.

The benefits of degree apprenticeships (to all stakeholders) should be clearly articulated. Which sectors are prioritised and capped will impact net inflow vs outflow of Welsh students.

It is important to note the importance of ensuring that any changes to apprenticeships in Wales do not risk weakening their potential for professional recognition, for example if there are moves as appear to be the case in England towards more flexibility in assessment that might reduce the consistency and rigour of assessment below that expected by the Engineering Council and Licensed PEIs.

Recommendations:

15. **Align Medr planning with economic development priorities** (advanced manufacturing, energy, semiconductor supply chains, construction, cyber/AI).
16. **Expand degree apprenticeships**, higher technical pathways and employer-led engineering pathways, **clearly articulating their benefits**.
17. Ensure assessment of apprenticeships changes do not pose a threat to future accreditation of apprenticeships.
18. Support industry placements and sandwich years through **stable funding models and support for companies based in Wales** or that work with Welsh universities.

Welsh-medium and bilingual tertiary education

Coleg Cymru research found that one of the reasons Welsh students are not progressing to STEM in higher education is the lack of Welsh speaking science teachers, particularly in North Wales and the Valleys in South. Students are taught in Welsh from age 4 to 16, however lack of Welsh speaking science teachers has resulted in students not studying triple science at Level 2 and not progressing to science at Level 3. This generates a lack of confidence to then continue in STEM. Once in higher education, providers support their statutory right to submit in Welsh if they wish and some modules and tutorials are offered in Welsh (e.g. Swansea), particularly for degree apprenticeships. This can be costly.

8. Demographics and lifelong learning

Wales faces significant demographic pressures, including a declining cohort of 18-year-olds. At the same time, engineering skills demand is expected to grow in areas such as renewable energy, digital technologies, construction and infrastructure renewal.

This combination makes lifelong learning and workforce reskilling particularly important for engineering. Wales needs to grow its domestic engineering pipeline to avoid skills leakage and reliance on importing talent.

Current tertiary structures, however, remain heavily qualification-bound and insufficiently flexible to support mid-career transitions or employer-led upskilling. Modular provision, stackable qualifications and flexible entry routes will be essential to support a broader engineering talent pipeline.

The further education sector plays a critical role in this pipeline and should be supported to provide strong technical preparation and progression routes into higher-level engineering qualifications.

Planning for demographic change

Demographic decline in the 18-year-old population will create structural challenges for tertiary providers. Engineering programmes are particularly exposed to demographic shifts because of their relatively small cohort sizes and high delivery costs.

Institutions and policymakers will therefore need to broaden participation beyond traditional school-leaver pathways.

Barriers to flexible lifelong learning

Engineering employers increasingly require flexible upskilling opportunities, yet existing tertiary structures remain heavily qualification bound. Funding and regulatory frameworks do not always support modular learning or employer-responsive provision.

Wales's higher levels of socio-economic deprivation contribute to non-linear learner progression. Many learners enter the workforce earlier and return to education later while balancing work and study. Current measures treat non-linear progression as non-completion, despite many learners using Level 5 qualifications as stepping-stones into employment before returning later. This issue is particularly relevant in priority sectors such as advanced manufacturing, engineering and digital.

Recommendations:

- 19. Incentivise and expand modular, stackable engineering qualifications and learning pathways** from Levels 2–7.
- 20. Create funding models** that support flexible lifelong learning in technical disciplines.
- 21. Incentivise and build a coherent offer linking FE, HE and employer-led training.**

Foundational skills

Strengthening foundational STEM skills is essential for expanding participation in engineering.

In particular, mathematics preparation at earlier stages of the education pipeline remains a persistent constraint.

Recommendation:

- 22. Address mathematics and science pipeline challenges in Welsh, English and bilingual at earlier stages of education (levels 2 and 3) to expand the engineering talent pool.** This includes both provision and staffing.

Personal Learning Accounts

The Personal Learning Account programme demonstrates the value of targeted reskilling initiatives aligned with labour market needs.

Engineering and technical disciplines are well suited to similar programmes because of strong employer demand.

Adult learning priorities

Adult learning policy should prioritise areas where skills shortages are acute and where training has strong economic returns. Engineering-related fields meet both criteria.

Recommendations:

23. Integrate engineering provision with regional growth deals and industrial clusters.

24. Align **participation targets** with projected **engineering skills demand**.

9. Collaboration across the tertiary system

Sector collaboration to manage complexity and high-cost delivery in engineering is essential to **skills pipelines, workforce transitions and regional skills needs**, especially given Wales' demographic shifts.

Engineering education is capital-intensive and depends on specialist infrastructure, laboratories, and highly skilled technical staff. Financial pressures on the sector means that a strategically planned system approach is essential to protect engineering provision across Wales.

Competition for the same student cohort often limits collaboration between providers, leading to duplicated provision and confusing learner pathways; this is also the case when setting up Degree Apprenticeships. While HE–FE engineering partnerships exist, many operate as outsourced delivery rather than integrated progression routes.

The emerging tertiary system under Medr provides an opportunity to move away from purely competitive provision models towards more coordinated planning.

Strategic coordination would reduce duplication, strengthen regional pathways and help avoid engineering and technical 'cold spots'.

Collaboration between universities, colleges and employers can support:

- shared infrastructure and laboratory facilities;
- joint programme delivery;
- coordinated regional provision;
- improved articulation between technical and academic pathways;
- strengthened regional pathways;

Without such coordination, there is a risk of fragmented provision and the emergence of regional cold spots where engineering education becomes unavailable. The avoidance of technical cold spots is paramount. A recent [Royal Academy of Engineering initiative](#) found that engineering employment is still, and becoming even more, geographically dispersed; this should not be perpetuated in HE/industry partnerships.

Barriers and enablers to collaboration

Engineering provision is capital-intensive and a more planned system approach is necessary to protect high-cost strategic disciplines.

Examples of collaboration

Collaborative models between universities, colleges and employers can help sustain engineering provision while maintaining regional accessibility.

Recommendations:

- 25. Use Medr to coordinate **regional planning** for engineering provision.
- 26. Support **joint programmes** between universities and FE colleges.
- 27. Incentivise **shared use of specialised laboratory infrastructure**.

Benefits and disbenefits of uncapped undergraduate markets

While competition can promote innovation, it may also incentivise institutions to prioritise lower-cost subjects over high-cost technical disciplines.

Engineering programmes are particularly vulnerable to these financial pressures.

Risks of higher education “cold spots”

Engineering provision in Wales is geographically concentrated, particularly in South West Wales and North East Wales. This distribution can create regional access barriers and may contribute to cross-border student flows.

As financial pressures continue to grow on engineering higher education, course closures are likely to exacerbate this problem.

Cold spots arise where regional provision, learner demand and subject interest do not align. They are particularly likely in areas with declining post-16 populations or limited transport and digital access. Additional factors – low aspirations, limited awareness of post-16 options, low employment and social mobility, and parental literacy/numeracy challenges – also contribute.

Recommendation:

- 28. Undertake a fuller analysis of **cold spots and contributing factors**.

29. Monitor **regional provision at an engineering discipline level** and intervene through financial support where necessary to prevent engineering cold spots.

10. Delivering for communities and the economy

Engineering education plays a vital role in supporting regional economic development and innovation.

Engineering graduates underpin key sectors including advanced manufacturing, infrastructure, construction, renewable energy, and digital technologies. These sectors are central to Wales's economic strategy and to national priorities such as the net zero transition.

Engineering departments also contribute significantly to research and innovation ecosystems, linking universities with industry and attracting external investment.

Maintaining strong engineering provision therefore supports both workforce development and regional economic resilience. Closer alignment between tertiary education planning and economic development strategies will be essential to maximise these benefits.

Leveraging research funding

Engineering teaching quality depends on proximity to research and innovation. Policies separating “skills” from “research” misunderstand engineering, where industrial innovation is inseparable from graduate capability.

Engineering research plays a critical role in attracting external investment and supporting innovation ecosystems. [A recent analysis for HEPI](#) highlighted the most recent estimates from DSIT suggest that, on average, £1 of civil public R&D investment generates £8 in net economic benefits for the UK over the long term. And this ignores the wider public benefits of R&D, which are more challenging to quantify, such as improvements in health outcomes or the environment. However, while Wales accounts for just under 5% of the total UK population, it has only about 2% of the UK R&D spend.

Engineering research in our universities is the engine of the Economic mission and it provides solutions to the most urgent challenges of our time: energy security, climate resilience, defence capability, public health, sustainable manufacturing and the transformation of our infrastructure.

In the process, through spin-outs and partnerships with industry and government, engineering research is creating jobs and prosperity in parts of the UK where other investment either does not reach or fails to establish sustainable growth.

The [HEPI analysis](#) showed that, in Wales, close to 40% of R&D activity is conducted in universities, which represents a higher proportion than in the UK as a whole. However, this reflects the relatively low (and declining) R&D investment from the private sector in the nation, rather than unusually high public sector investment into our universities. Indeed, key investments into R&D through our universities have been proportionally lower than in the rest of the UK for many years.

The review's evidence points to the need to strengthen postgraduate capacity.

Recommendation:

30. **Review research funding** and consider stabilising **incentives for postgraduate engineering study tied to research capacity and industrial collaboration.**

Specialisation and collaboration

Support for strategic specialisation can strengthen research and teaching clusters while avoiding inefficient duplication. However, careful planning is needed to ensure regional accessibility. EPC research on the [impact of Brexit](#) found, for example, that *all* chemical engineering research in Wales was EU-funded in 2016-7.

Adequate research funding and strengthening the research-teaching link is therefore essential.

The review's mapping of subject distribution should guide decisions about institutional strengths and coordinated provision, avoiding destabilising competition for scarce student markets. Wales's ambitions require a robust and regionally accessible engineering education and research base.

Recommendations:

31. Medr should use review data to **plan a coordinated engineering portfolio**, across both teaching and research balancing excellence with regional access.
32. **Align sector planning with local economic clusters where engineering skills are critical.**
33. Align tertiary planning with **regional industrial strategies**, using review insights to prioritise engineering areas with the greatest multiplier effects.
34. Incentivise **shared provision models**, including joint degrees, collaborative labs, and cross-institution articulation.
35. Provide **stable support for engineering postgraduate education** linked to research capacity.
36. **Review research funding** cold spots and **protect the research-teaching link** in engineering.

37. Promote **engineering research engagement** as part of curriculum delivery, advancing innovation and skills simultaneously.

Opportunities and risks of AI

AI can personalise learning, support accessibility (including Welsh-medium provision) and automate routine tasks, enabling staff to focus on high-value teaching. However, over-reliance risks undermining academic integrity and critical thinking. Inequalities in digital access, privacy concerns and potential algorithmic bias require careful management. Wales needs consistent guidance, investment in digital infrastructure, staff development and learner access to devices.

AI will transform both engineering practice and engineering education. Engineering programmes will play a central role in developing the skills required to design, deploy and regulate emerging technologies.

Recommendations:

38. Explored and address digital access barriers.
39. **Produce an AI strategy** including guidance, digital infrastructure, staff development and learner access to devices.

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