NPL
National Physical Laboratory

Corporate Plan 2023-27

Providing the measurement capability that underpins the UK's prosperity and quality of life

National Physical Laboratory

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Corporate Plan
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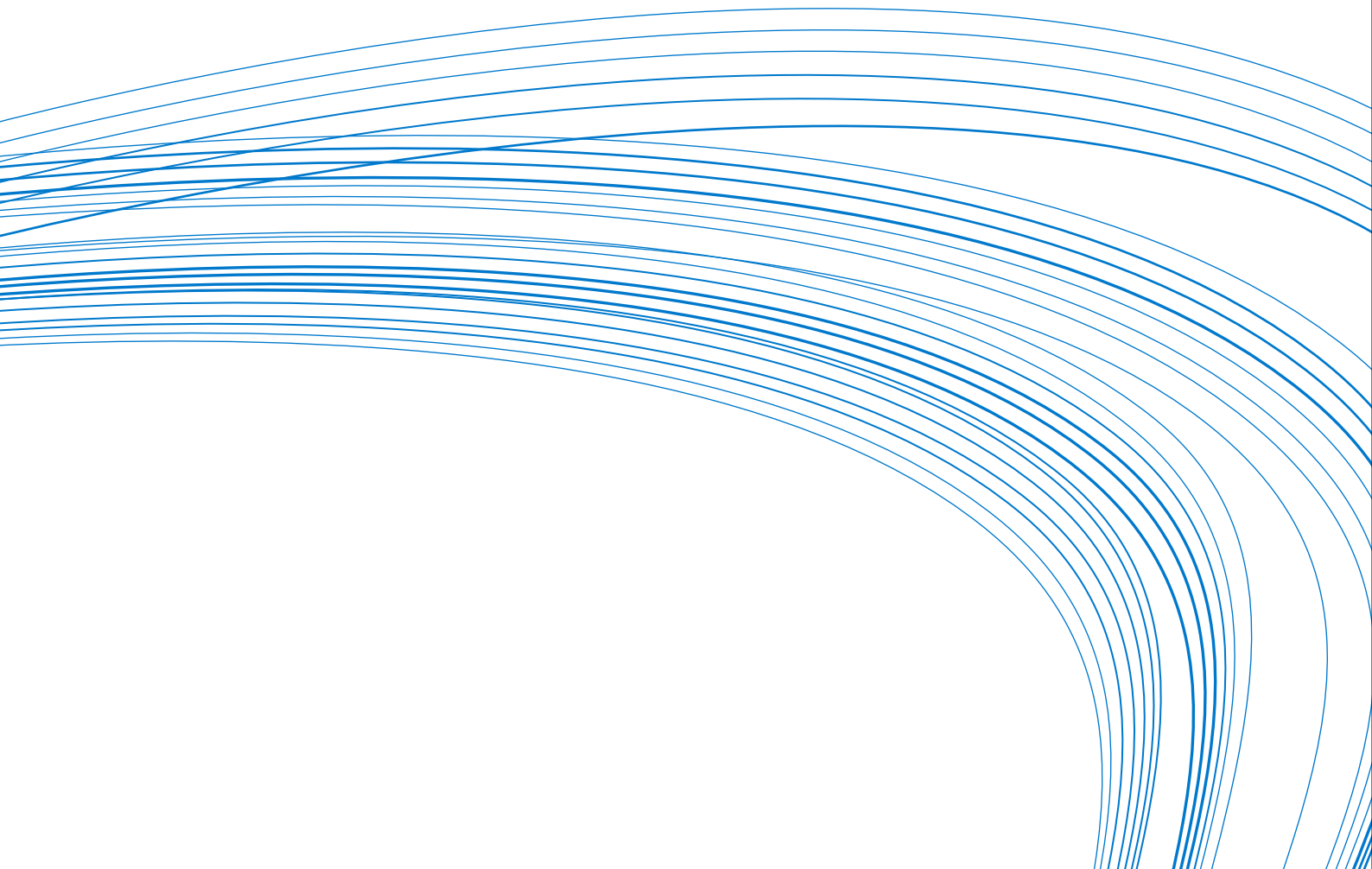
We are the UK's National Metrology Institute (NMI), a world-leading centre of excellence that provides cutting-edge measurement science, engineering and technology that underpins prosperity and quality of life in the UK.



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Introduction from Dr Peter Thompson | CEO

The next five years provide a wealth of opportunity for a national laboratory like NPL. Every day we are applying our science and engineering expertise to further the innovation landscape in the UK, convening thought-leaders across a wide range of industries and sectors, and providing impact by collaborating with companies who develop the latest technologies.

For over 120 years our expertise in measurement science has shaped the world around us. Our corporate plan is our current expression of this and sets out NPL's priorities for the next five years.

Today, NPL's mission to enhance the UK's prosperity and quality of life requires an ever-sharp focus given the unprecedented challenges to our environment, our health and our security and resilience. We are already driving forward science, technology and innovation in the UK and now we will leverage this strategic advantage in emerging sectors such as quantum technologies, artificial intelligence, engineering biology, and telecommunications.

Our exciting work spans a broad range of disciplines:

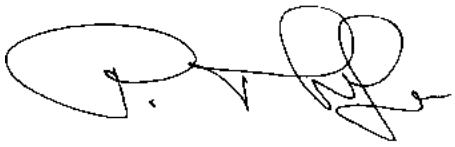
Resilient timing capability, positioning the UK as a world leader in quantum, and operating the UK Telecoms Lab (UKTL) on behalf of the Department for Science, Innovation and Technology enabling the supply chain diversification strategy are just a few areas where we are assuming a national leadership role.

We are persistently pursuing health diagnostic opportunities, applying our expertise in digital health, mass spectrometry imaging and health physics. And we are playing a prominent role in emissions monitoring to ensure the UK remains on the right path to reaching net zero.

NPL Environment monitoring

Looking further ahead, we will grow the scope and impact of our programmes, leading on new challenges and strengthening our partnerships in sectors such as space and nuclear. Crucially, we will continue to accelerate innovation for businesses and engage with SMEs, focusing on energy security and technologies for green growth, reaching across all regions of the UK as well as to other nations.

None of this is possible without our people and our values, guiding us to make the right decisions and working together towards these shared goals. The health, wellbeing and happiness of our people is our highest priority. We recognise the unique value every person brings, and this corporate plan is all about making their experience at NPL special. We will continue to focus on the whole employee experience, from career development and fulfilment to inspiration and inclusion, ensuring everyone who works at NPL can flourish and feel truly at home.



Dr Peter Thompson | CEO

Introduction from Prof Graeme Reid | Chair

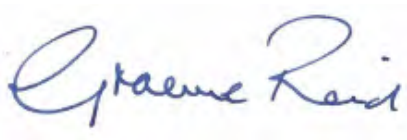
The UK faces many economic opportunities and challenges.
In 1900 NPL was created to bring science and technology to the benefit of trade.
Has there ever been a more important time for NPL?

When NPL was founded in 1900, metrology was very much a physical activity, comparing measurements with actual artefacts. In the 21st century, physical measurements are increasingly being translated into digital forms or even taken digitally, while data has become the currency of a digital economy. As digital technologies impact on almost everything that we are doing and how we do it, NPL has a pivotal role to play in integrating the physical and digital worlds through measurement infrastructure and technologies.

Over the period of our corporate plan, we will deliver world-leading measurement science for the digital age, providing confidence in data that enables innovation and trade to flourish. This will enhance the UK's position as a global science superpower, by ensuring the UK continues to lead the development of metrology aligned with scientific and technological progress and the practical application of measurement through defining and maintaining global standards.

Our ways of working and delivery of outcomes will increasingly transition to digital processes and channels, reflecting the UK as a digital society & economy and the emergence of digital metrology in the international system of measurement.

NPL is ready for transition and excited to be a part of an ever-changing world, bringing its expertise and experience as a key enabler.



Prof Graeme Reid | Chair

NPL Outreach programme

Our priorities

Over the period of the corporate plan we will deliver world-leading measurement science for the digital age, providing confidence in data that enables innovation and trade to flourish.

These priorities are:

1. **Innovation in action** | **Extraordinary impact**
   developing the metrology required to ensure the successful deployment of new technologies for UK prosperity and quality of life

2. **Enduring capability** | **Excellent science and engineering**
   building and maintaining resilient metrology capability for UK enterprise

3. **Inspiring for the future** | **Exemplary national laboratory**
   investing in people and places, ensuring NPL is recognised as a great place to work and creating opportunities to embed metrology skills throughout the UK

Our vision is to be an exemplary national laboratory that undertakes excellent science and engineering, using this to deliver extraordinary impact for the UK.

The plan can be summarised as "The House of NPL", as shown in Figure 1.

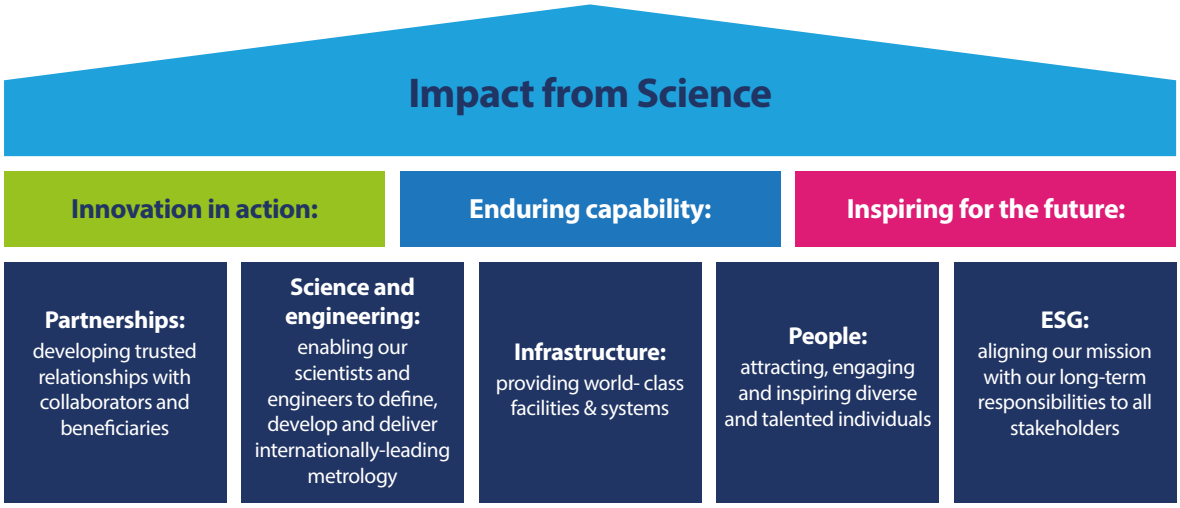


Fig.1 - House of NPL

Innovation in action

Four challenge areas have been identified where metrology is a critical success factor for UK prosperity and quality of life. Key deliverables for each of these are commissioned by the Department for Science, Innovation and Technology (DSIT).

Health – to accelerate innovation and the advancement of technology, which will enable the UK to diagnose, treat, cure and prevent a much wider range of diseases than is currently possible

- Accelerate innovation and access to new drugs and future therapies
- Accelerate innovation and access to medical devices and technologies
- Use metrology to support the bioeconomy
- Earlier detection, diagnosis and optimised treatment of priority diseases

Security and resilience – to secure our digital society and economy, from confidence in communication infrastructures to trusted timing, ensuring a resilient foundation for enterprises and citizens

- National Timing Centre (NTC)
- Quantum test and evaluation
- Autonomous vehicles
- Communications

Environment – ensuring the necessary actions to support a sustainable future within the UK, as we transition to net zero, are identified and implemented

- Emissions inventory for climate action and feedback
- Climate observation to assure climate response
- Future energy including hydrogen and CCUS
- Zero-carbon energy for transport sector through batteries, fuel cells and non-hydrocarbon combustion

Prosperity – verify and validate changes of products, processes, services and technologies through existing or new measurement standards, creating value and impact across the UK through the measurement infrastructure that enables enterprises to maximise productivity, accelerate growth, and improve performance though innovation

- Ensure operability and enable future innovation of critical measurement infrastructure to support enterprise
- Enable innovative measurement science and engineering that ensures the UK leads international pre-standards research in critical technology areas
- Deliver innovative approaches for medicines manufacturing to transition from laboratory-based R&D to high-volume manufacturing capability
- Deliver measurement innovation and pre-standards research to optimise engineering and manufacturing and minimise negative environmental impact

Partnerships

Our approach

The way NPL supports firms in delivering impact from science has transformed in the last five years. We are increasingly working in emerging sectors with highly innovative businesses. By taking major roles in national programmes to address our top 8 innovation challenges, we have been able to develop new measurement capability for the UK that will endure long after the original investment was made. This new measurement infrastructure provides innovative UK businesses with the reassurance that they will be supported throughout the key stages of technology maturity giving them the confidence in data essential to developing and launching their new products and services sooner and delivering impact on the UK's economic prosperity and quality of life.

2023-27 Strategic outcomes

- **Maximising impact** – We will be supporting an increasing number of firms throughout their TRL journey, using a range of funding sources ensuring that innovative UK businesses and institutions have the confidence in data to accelerate innovations that address the challenges of our environment, health and security, while generating economic prosperity for the UK.
- **Address challenge-focused, high impact problems** – We will have developed key partnerships across Government and UK, working with key stakeholders to define the high-level requirements to address the UK's challenges. We will have defined how and where NPL can play a critical role and developed appropriate business cases aligned with our business model.
- **Exploiting new measurement infrastructure** – We will be deploying the outputs of development programmes in sustainable exploitation routes, including the provision of new measurement services and alternative sources of investment to develop and market knowledge assets.

NPL engineering – Mass metrology

NPL industry interactions

Enduring capability

We are responsible for developing, maintaining and improving the measurement capability of the UK. We look after the nation's critical measurement infrastructure and national measurement standards and ensure they are fit for purpose and internationally comparable. We continually scan the horizon for new technologies and scientific trends to guide the future development of this measurement capability.

- **Our international role**
  Ensuring that NPL's scientific capabilities and impact continue to be world leading and fit for purpose now and in future through independent assessment and comparison with the global community of other National Metrology Institutes

- **Enabling the digital transformation of the economy and industry**
  Supporting the UK's global relationships through digital certification, agile trade regulations, product information and safety standards

- **Development and maintenance of measurement standards**
  Seeking efficiency gains and improved customer satisfaction through a focused programme of automation and digitisation.

International Measurement System

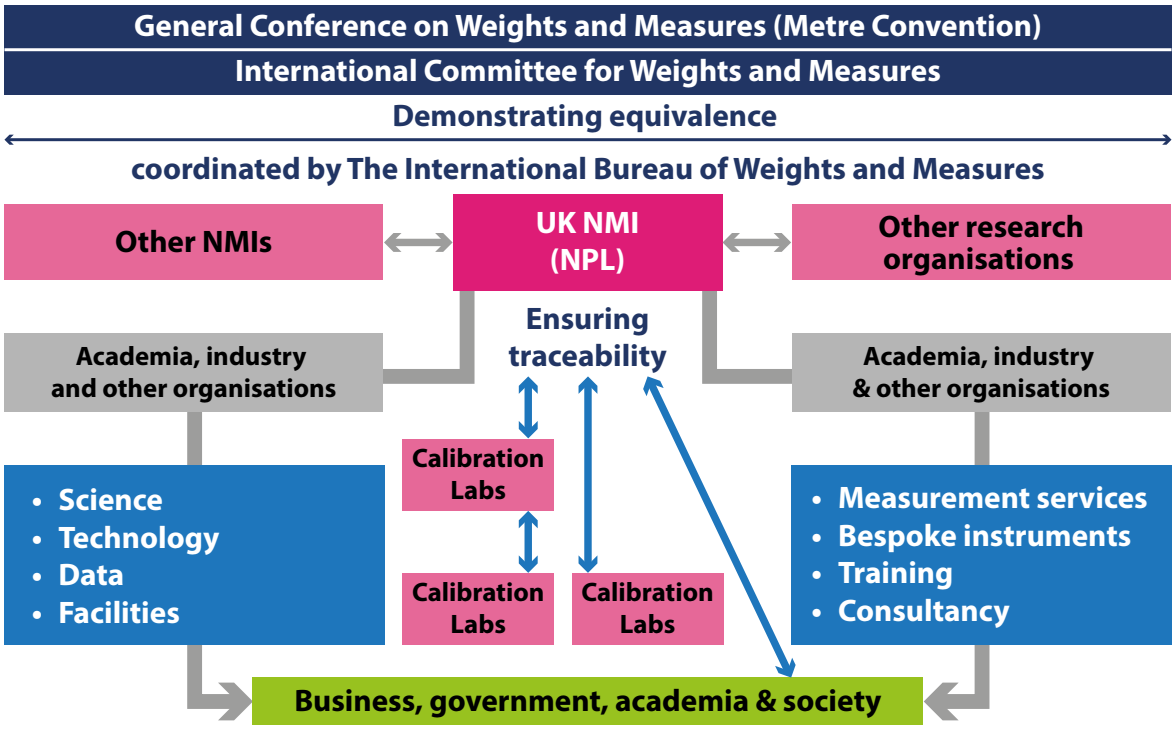


Fig.2 - International Measurement System

Science and Engineering

Our approach

Our science strategy is to build and maintain resilient metrology capability for UK enterprise to benefit from. Our goal is to ensure measurements in the UK can always be made with integrity and consistency, giving businesses and institutions the confidence and assurance needed to operate and trade effectively and securing the UK's place as a science super-power.

Strategic outcomes

- **NPL is recognised internationally for delivering curiosity-driven research, aligned with the priorities of the 2020 measurement foresighting work and set out in the 2022 metrology roadmaps.**
  The foresighting project identified three priorities for the long-term future of metrology: a digitally enabled measurement system, metrology for complex systems, and metrology to support decision making. NPL will develop the capability to realise international science leadership and UK benefits in these priority areas. NPL has developed a comprehensive set of research roadmaps that will guide capability development.

- **NPL is recognised as the national laboratory for innovation, aligned with the implementation of a 'digital SI' and delivery of national challenges.**
  To support innovation in the national challenges and implement a 'digital SI' we will focus on developing capability to deliver impact from science, seeking to act where NPL is the point of highest reference, delivers unique physical measurement standards, and uniquely improves and extends comparability in measurement.

- **NPL retains its world leading NMI reputation by focussing on developing and disseminating the revised SI and launching new digital standards.**
  We will strengthen our position as an internationally leading NMI through implementing the revised SI to underpin future national primary measurement standards, providing global thought leadership, influencing the international metrology agenda, benchmarking with our global peers, and working to advance UK research priorities. Dissemination from primary and derived standards to end users via measurement services is our primary route to impact and of the 285 firms NPL regularly supports, 165 are solely through the measurement services we deliver.

Infrastructure

Our approach

To continue providing the measurement infrastructure the UK needs, NPL requires appropriate long-term facilities suitable for its operations at the cutting edge of science and technology.

The main building on NPL's Teddington site is at its designed mid-life and requires a renewal programme in order to support operating activity for another 20 years.

There is opportunity to deliver a greater level of activity in other regions of the UK, not only to support the UK government's 'Place' Agenda, but to help recruit and retain talent differently and leverage our investments in remote tools and changes in hybrid working.

The increasing reliance on digitalisation and the value of data in science and innovation means NPL has been committed to digital modernisation since 2019.

We have embarked on a programme of digital modernisation, underpinned by the implementation of a new cloud-based integrated Enterprise Resource Planning (ERP) system.

Strategic outcomes

- World-class metrology facilities that provide a resilient infrastructure configured to support NPL to maximise impact.
- World-class digital infrastructure for NPL's science delivery and wider operation.

NPL is committed to creating scientific impact, improving quality of life and enabling trade in an environmentally sustainable manner, while reducing its operational environmental impact to the point of achieving net zero. We will consider our environmental impact in all our decision-making.

NPL medical marine and nuclear science

NPL Environment National Challenge

Inspiring for the future

Measurement is a fundamental requirement throughout science, technology and industry – around 6% of all employment in the UK involves taking measurements.* This requires skilled staff and learning and development at all career stages.

We support this through continuous development opportunities for our own staff, accredited apprenticeships and PhD training and providing metrology training to industry throughout the UK.

- **Foster an inclusive environment**
  We will continue to develop our diversity and inclusion programme to ensure all staff feel part of "OneNPL" through our culture and values

- **Expand our regional footprint**
  Maximise impact through strategic partnerships and clustering with regional centres of excellence

- **Invest in digital collaboration tools**
  The Covid-19 pandemic accelerated the transition to hybrid working and we have made use of digital collaboration tools and flexible working patterns to deliver our work

NPL is committed to supporting those choosing a career in STEM. Through our outreach and apprenticeship programmes as well as through our PGI and NPL Academy, we will create more opportunities for diverse talent to enter the STEM sector and develop as world-leaders in their field.

NPL Apprenticeships

People

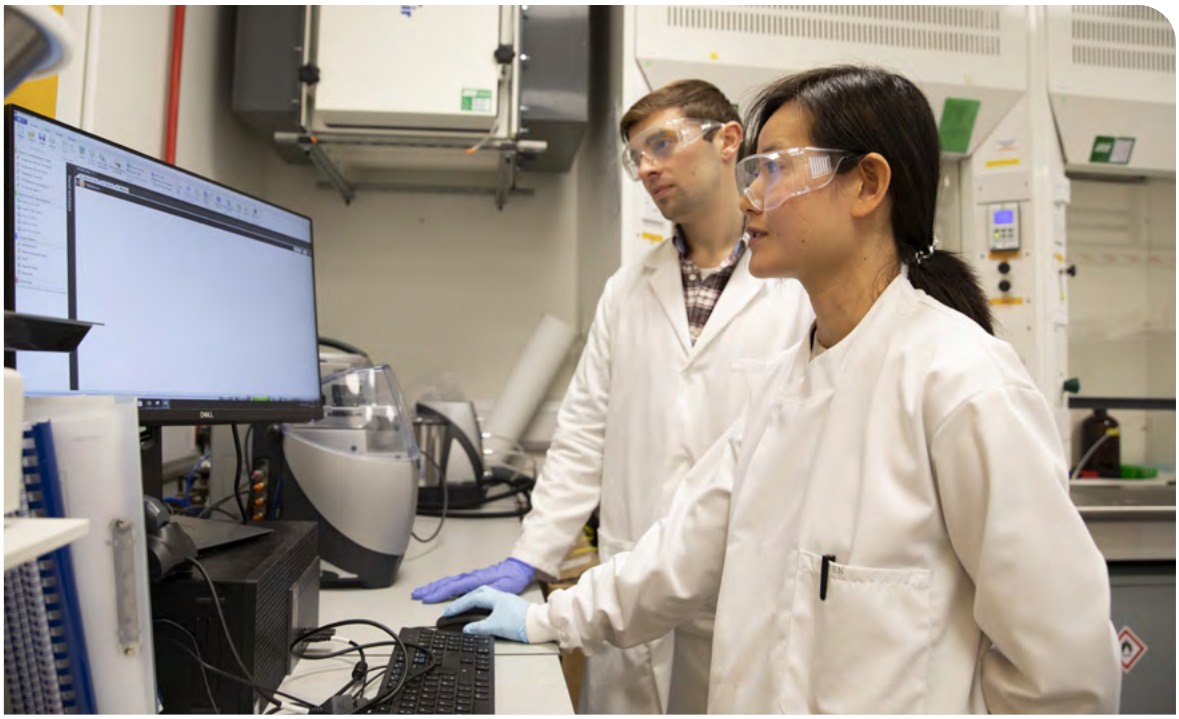
Our approach

Our aim is to attract, engage and inspire diverse and talented individuals who will love working at, or with, NPL for years to come.

The People Strategy sets out to create an employee value proposition (EVP) that will guide everything we do so that our people feel its presence every day –in the people they work with, the environment that surrounds them, the opportunities they're given and the recognition they receive. It will characterise the whole people cycle, aligning activities and interactions to ensure the most talented and diverse individuals want to work with, or for us.

Strategic outcomes

- A place to work where all people feel 'at home' and work collaboratively with each other adding value and feeling valued for their unique contributions.
- Exceptional and accountable leaders who coach and inspire our people to deliver extraordinary impact.
- The right people are in the right place at the right time with the right opportunities, creating high levels of fulfilment, motivation, and productivity.



NPL chemical and biological sciences

Environmental, social and governance

Our approach

Ensuring environmental impact, social impact and good governance is considered in all our decision-making, ensuring that our policies and processes reflect our commitment to these considerations through building awareness, providing training & systems support and transparent reporting.

Our NPL Values align with the principles of ESG, particularly to "nurture and respect" when viewed through the lens of people (staff), prosperity (our mission) and planet (external stakeholders).

This is a long-term commitment for NPL. We will take a risk-based approach to prioritising activities and look to learn from the experiences of our peers in other similar organisations to accelerate our progress and avoid pitfalls.

Strategic outcomes

- NPL is recognised by its owner and by its key stakeholders as demonstrating long-term sustainability and performance through excellence in ESG.
- NPL is recognised internally (staff) and externally (public, customers & partners) as delivering social impact, making a meaningful difference to the world and can demonstrate this.
- NPL has established a governance framework that enables larger programmes of work with industry and other partners to be delivered in innovative business models.

NPL culture and values – OneNPL

NPL Water rockets event

Measuring our impact

Our primary approach for assessing our impact is via the National Measurement System (NMS) Customer Survey which assesses the economic and societal benefits of NMS funded activities. The survey will be repeated at regular intervals during the period of this five-year plan.

Additional data on impact is provided through specific programme follow up – e.g., Analysis for Innovators (A4i) and Measurement for Recovery (M4R) schemes.

Independent econometric studies of our impact also provide valuable data. These consider the performance of enterprises supported by NPL compared with matched controls and provide data on our role in supporting UK prosperity.

NPL gathers robust evidence of the impact generated by the National Measurement System (NMS) and its associated programmes. NPL follows the approach set out in the NMS Evaluation Framework, conforming to HMT's Magenta Book on acceptable methodologies. NPL is evaluated using a mixture of econometrics, indicators, surveys, and qualitative studies. The evidence being gathered feeds into an economic model for valuing benefits channelled through the UK's private sector.

A recent review of evaluation activities is available on the website:
npl.co.uk/government/evidence-and-analysis

NPL public engagement – Open day

NPL diversity and inclusion – purple light up

References

*** NPL's analysis of these datasets found that:**
14.3% of employees in the research and development sector are calibrators, testers, or analysers. A further 5% of employees take measurements as part of their role.

http://eprintspublications.npl.co.uk/9064/1/IEA7.pdf
Figure C on page 8.

https://www.npl.co.uk/about-us/who-we-work-with/government/npl-evidence-and-analysis/2-4-gdp-target-iea3.aspx
Section 6, page 16.

NPL

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To find out more about NPL:
npl.co.uk

To get in touch:
npl.co.uk/contact
020 8977 3222

Hampton Road
Teddington
Middlesex
TW11 0LW

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