



Engineering for One Planet

Introducing the Engineering for One Planet Framework:

*AHEP4 Mapping to the Essential
Sustainability-focused Learning Outcomes for
Engineering Education*

Engineering Professors Council
Sustainability Toolkit Webinar
March 28, 2024



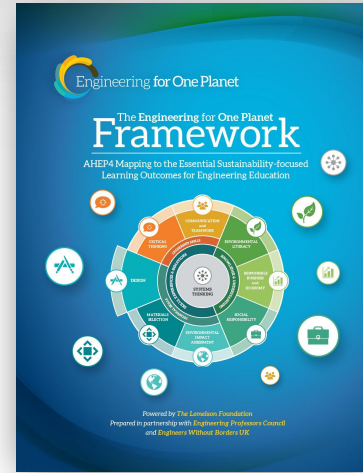


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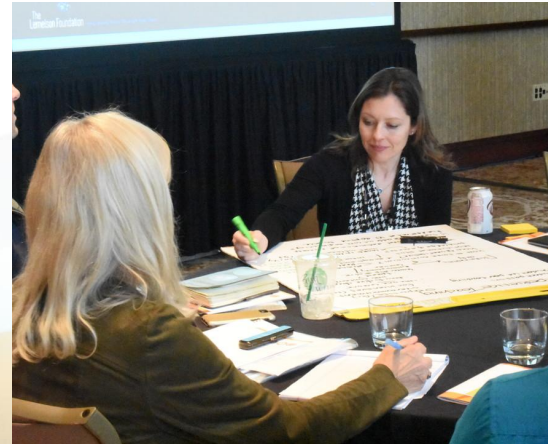
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Engineering for One Planet Catalysts





Our Collective Goal:

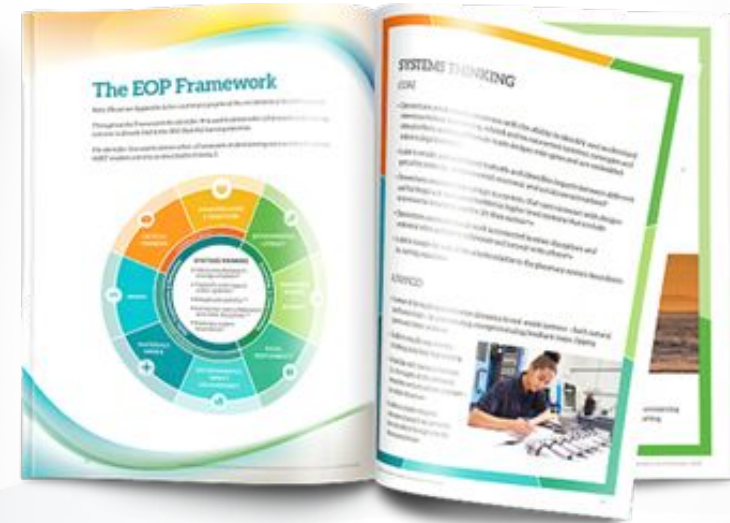
Transform engineering education so all engineers are equipped with the skills, knowledge, and understanding to protect and improve our planet and our lives.

Guided by collaboration among:

Hundreds of stakeholders in academia, industry, nonprofit, and public sectors.

EOP Framework:

Essential Sustainability-focused Learning Outcomes for Engineering Education
Download for free online



EOP Framework:

A vetted menu of sustainability-focused learning outcomes across 9 topic areas.

About:

- Simplifies curricular change by providing specific learning outcomes to add to courses
- Launched in 2020 - nearly 100 stakeholders provided input; EOP resolved 400 comments
- Pilot tested by 5 schools (2020-2022) and used by dozens of other schools since
- Mapped to ABET requirements and UN SDG12
- Revised in 2022 with additional feedback; resolved 600 comments

-  Systems Thinking
-  Environmental Literacy
-  Responsible Business and Economy
-  Social Responsibility
-  Environmental Impact Assessment
-  Materials Selection
-  Design
-  Critical Thinking
-  Communication and Teamwork

EOP Framework:

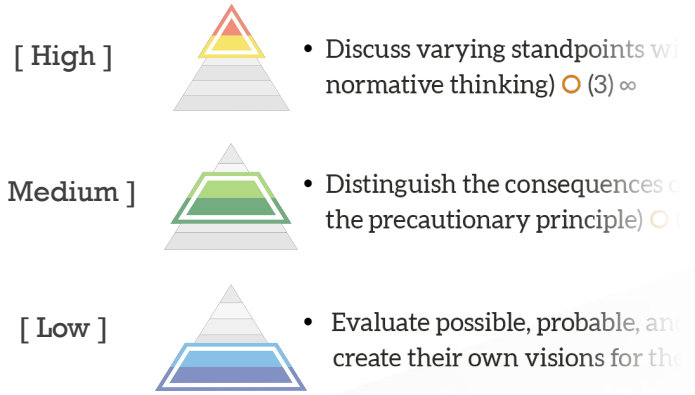
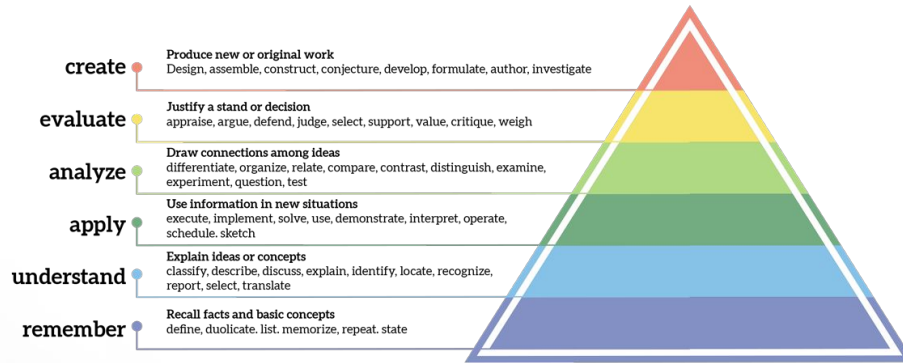
9 Topic Areas



-  **Systems Thinking**
-  **Environmental Literacy**
-  **Responsible Business and Economy**
-  **Social Responsibility**
-  **Environmental Impact Assessment**
-  **Materials Selection**
-  **Design**
-  **Critical Thinking**
-  **Communication and Teamwork**



EOP Framework: Mapping to Bloom's Taxonomy



EOP Framework:

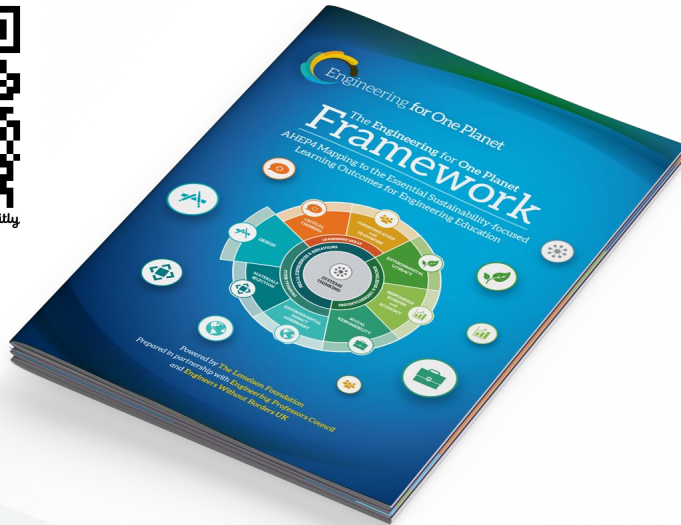
Mapping to ABET Student Outcomes & UN SDGs



- Explain interconnectedness (e.g. intersecting, related and/or connected systems; human actions and global environmental and social impacts and consequences; synergies and rebound effects) and how all human-made designs and activities rely upon and are embedded within ecological and social systems ○ (4)
- Identify dynamic impacts between and among different parts of the system (i.e., social, environmental, and economic considerations) ○ (4)
- Apply relevant concepts from required disciplines to the study of real-world problems and their solutions with empathic and ethical consideration for communities/societies, environmental justice, and cultural awareness ○ (2,4,7) 🌐
- Create solutions that consider the scale of the activity relative to the planetary system boundaries (i.e., carrying capacities) ○ (2) 🌐
- Create designs that include communities/societies, environmental ecosystems, and the life they sustain while keeping systems dynamics concepts in mind (e.g., feedback loops, complex cause-effect chains, cascading effects, inertia, tipping points, legacy, resilience, adaptation, energy systems and flows, etc.) ○ (2,4) 🌐

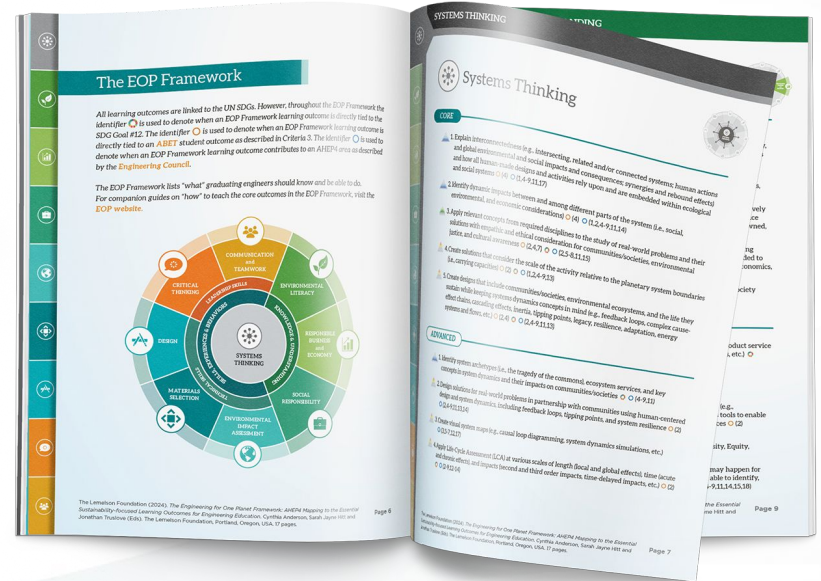
EOP Framework

AHEP4 Mapping to the Essential Sustainability-focused Learning Outcomes for Engineering Education



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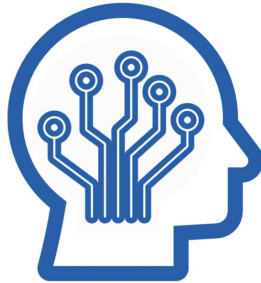
EOP Framework: AHEP4 Mapping



The Accreditation of Higher Education Programmes (AHEP)

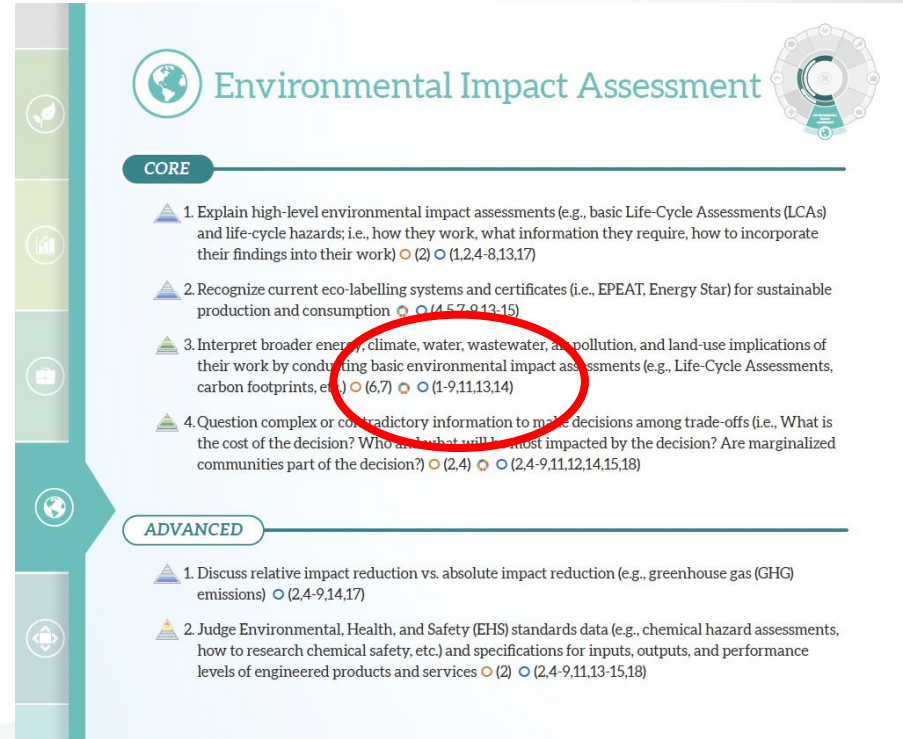
Fourth edition

Published August 2020



Area of Learning	Chartered Engineer (continued)		
	Bachelors (Honours) degrees and equivalents (continued)	Masters degrees other than the Integrated Masters and Doctoral programmes and equivalents (continued)	Integrated Masters degrees and equivalents
On successful completion of an approved or accredited programme, an individual will be able to:			
The engineer and society			
Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, and help ensure that the benefits of innovation and progress are shared equitably and do not harm the natural environment or deplete natural resources to the detriment of future generations.			
Sustainability	C7. Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.	M7. Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts.	M7. Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts.
Ethics	C8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.	Learning outcome achieved at previous level of study.	M8. Identify ethical concerns and make reasoned ethical choices informed by professional codes of conduct.
Risk	C9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.	Learning outcome achieved at previous level of study.	M9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.
Security	C10. Adopt a holistic and proportionate approach to the mitigation of security risks.	Learning outcome achieved at previous level of study.	M10. Adopt a holistic and proportionate approach to the mitigation of security risks.
Equality, diversity and inclusion	C11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.	Learning outcome achieved at previous level of study.	M11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.

EOP Framework: Mapping to AHEP4



The infographic is titled "Environmental Impact Assessment" and is divided into two main sections: "CORE" and "ADVANCED". It features a vertical sidebar on the left with icons for a leaf, a bar chart, a briefcase, a globe, and a person. The "CORE" section contains four numbered items, each with a triangle icon and a list of AHEP4 codes. A red circle highlights the text "conducting basic environmental impact assessments" in item 3. The "ADVANCED" section contains two numbered items, each with a triangle icon and a list of AHEP4 codes. In the top right corner, there is a circular diagram with various icons around its perimeter and a central globe.

Environmental Impact Assessment

CORE

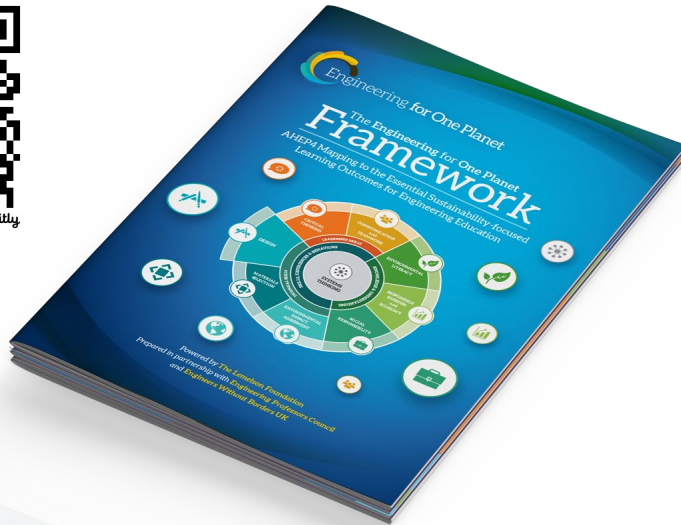
1. Explain high-level environmental impact assessments (e.g., basic Life-Cycle Assessments (LCAs) and life-cycle hazards; i.e., how they work, what information they require, how to incorporate their findings into their work) ○ (2) ○ (1,2,4-8,13,17)
2. Recognize current eco-labelling systems and certificates (i.e., EPEAT, Energy Star) for sustainable production and consumption ○ (4,5,7,9,13,15)
3. Interpret broader energy, climate, water, wastewater, air pollution, and land-use implications of their work by conducting basic environmental impact assessments (e.g., Life-Cycle Assessments, carbon footprints, etc.) ○ (6,7) ○ (1-9,11,13,14)
4. Question complex or contradictory information to make decisions among trade-offs (i.e., What is the cost of the decision? Who and what will be most impacted by the decision? Are marginalized communities part of the decision?) ○ (2,4) ○ (2,4-9,11,12,14,15,18)

ADVANCED

1. Discuss relative impact reduction vs. absolute impact reduction (e.g., greenhouse gas (GHG) emissions) ○ (2,4-9,14,17)
2. Judge Environmental, Health, and Safety (EHS) standards data (e.g., chemical hazard assessments, how to research chemical safety, etc.) and specifications for inputs, outputs, and performance levels of engineered products and services ○ (2) ○ (2,4-9,11,13-15,18)

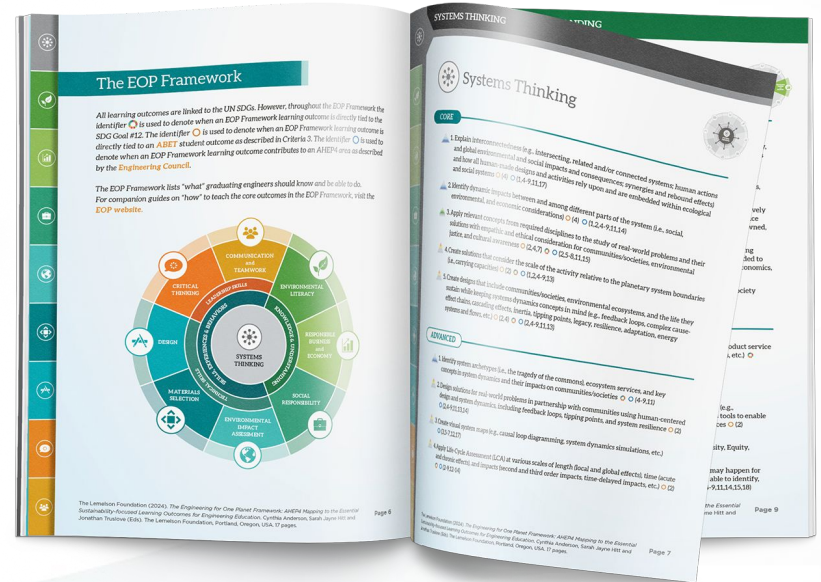
EOP Framework

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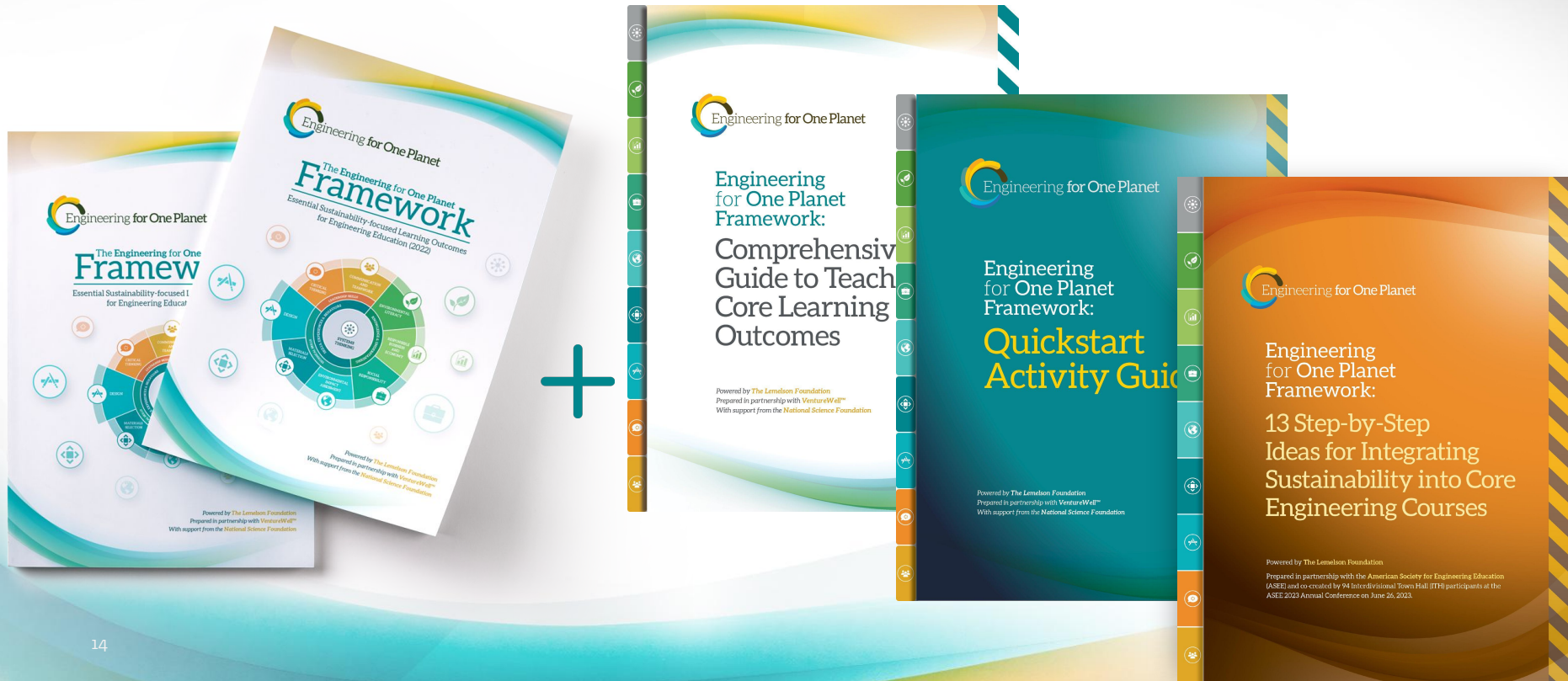
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EOP Framework and 4 Companion Teaching Guides

Goal: Make EOP Framework implementation easier





Ways you can take immediate action!

1. Download, use & share free online teaching resources

- EOP Framework
- Companion “how to” teaching guides

2. Tell your peers about open source EOP resources

3. Share your feedback with us

4. Become a signatory

- Be listed on the EOP website to demonstrate your support for integrating sustainability into engineering education



Don't miss news and opportunities!

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Quarterly**



**EOP LinkedIn:
Breaking news**



Thank you!

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