



The Future of Fish Feed

Alan Shaw

President & CEO
Calysta



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- Alan Shaw, Ph.D., is President and Chief Executive Officer of Calysta and a member of the Board of Directors.
- He joined in 2012. Dr. Shaw is a veteran biotechnology entrepreneur and chemical industry executive, with more than 25 years experience building and leading technology companies.
- Before joining Calysta, he served for 10 years as President & CEO and a director of Codexis, a developer of cost-advantaged processes for production of biofuels, biobased chemicals and pharmaceuticals.
- Prior to Codexis, Dr. Shaw held senior operating and business development positions in the United Kingdom for Chiroscience Group plc and for the chemical and biopharmaceutical units of Clariant and BTP plc.

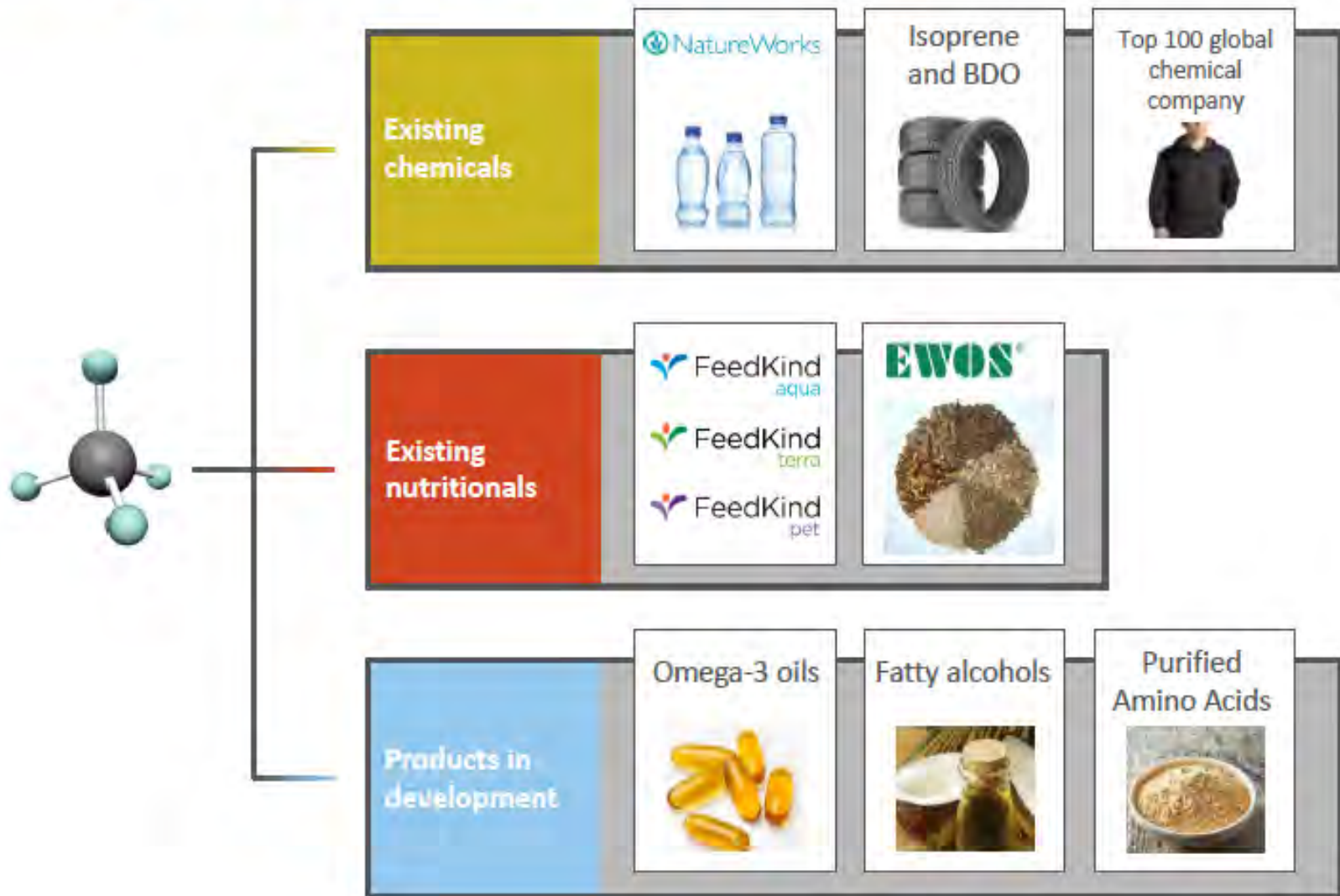


GOAL 2015

Alan Shaw, CEO

CALYSTA

Making everything from plastics to protein



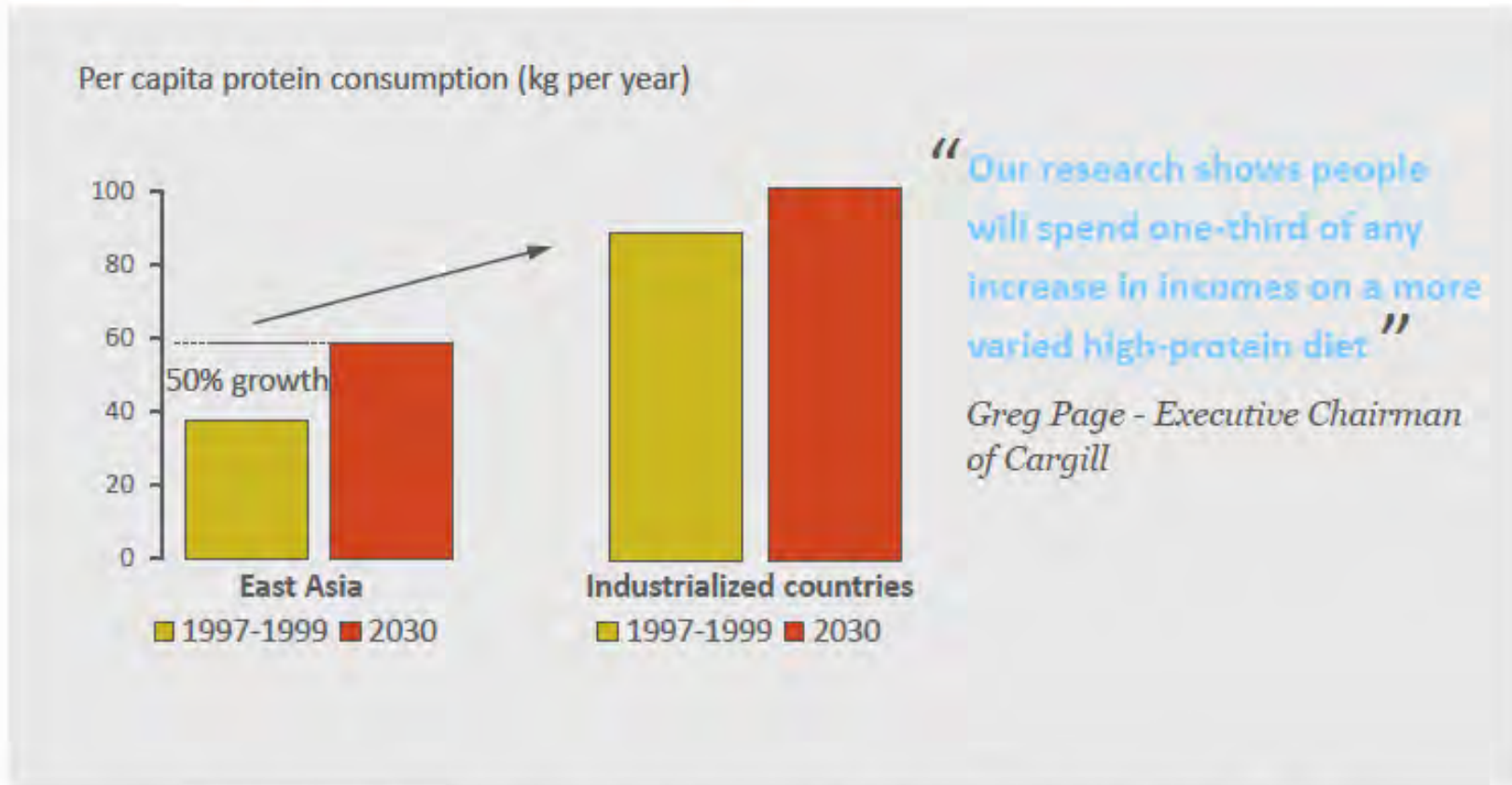
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Protein through 2050

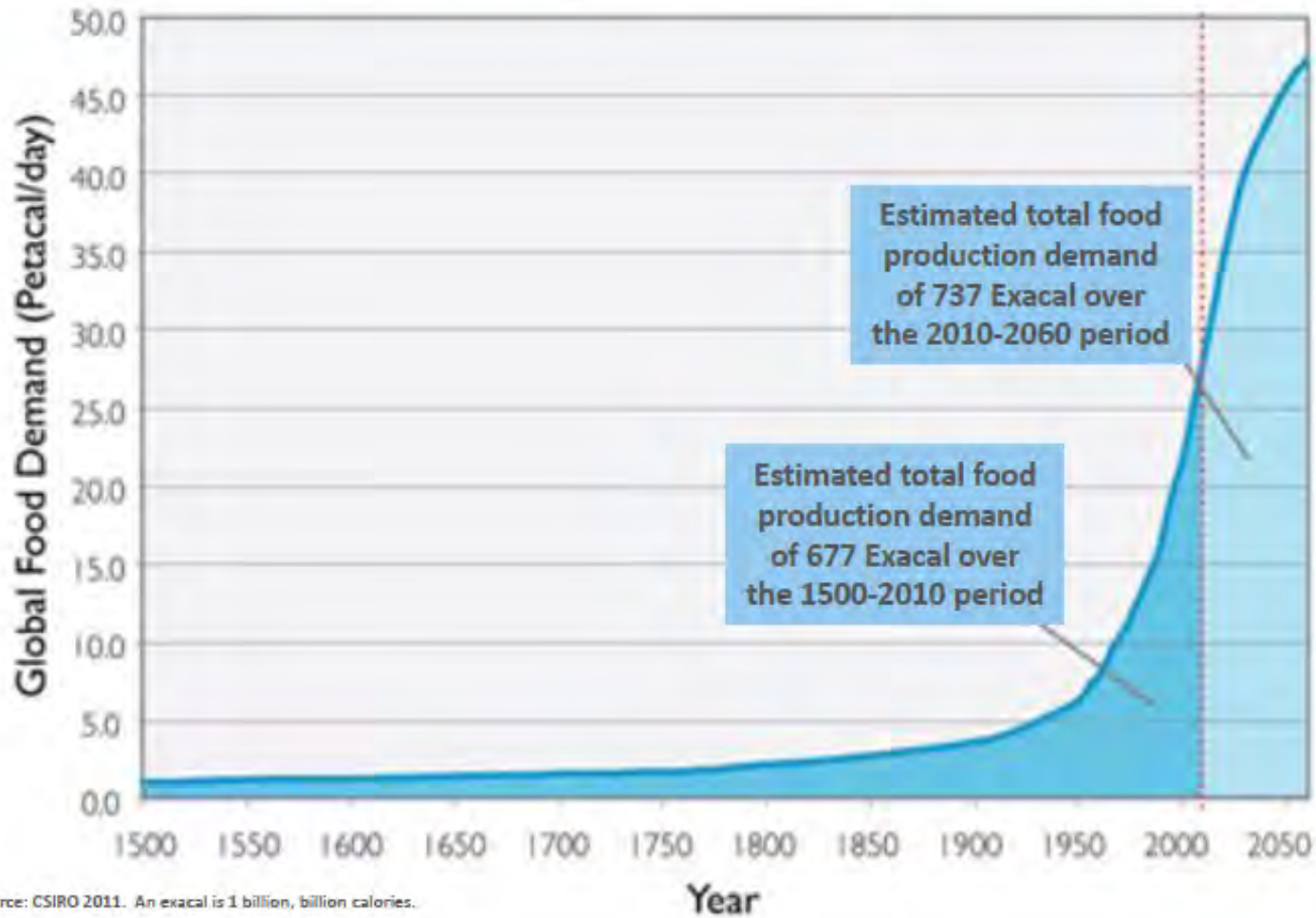
A global challenge

By 2050, 9.6B people will demand 75% more protein than currently available



Source: UN World Population Prospects: The 2012 Revision. World agriculture: towards 2015/2030. Food and Agriculture Organization of the United Nations, 2002.
World agriculture: towards 2030/2050. Food and Agriculture Organization of the United Nations, 2012.

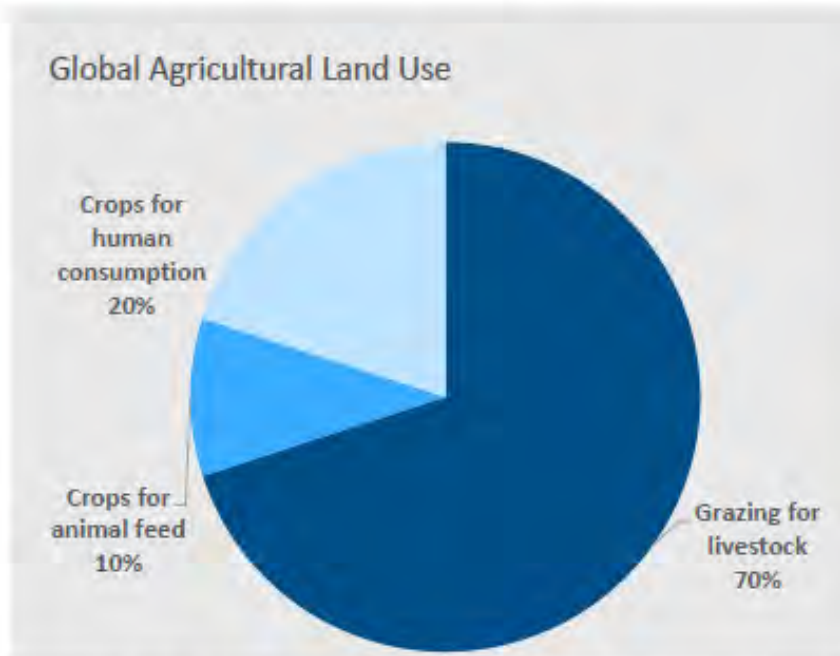
More food production is required in the next 50 years than in all of human history



Source: CSIRO 2011. An exacal is 1 billion, billion calories.

Growth to 2050 cannot depend on expanding land use

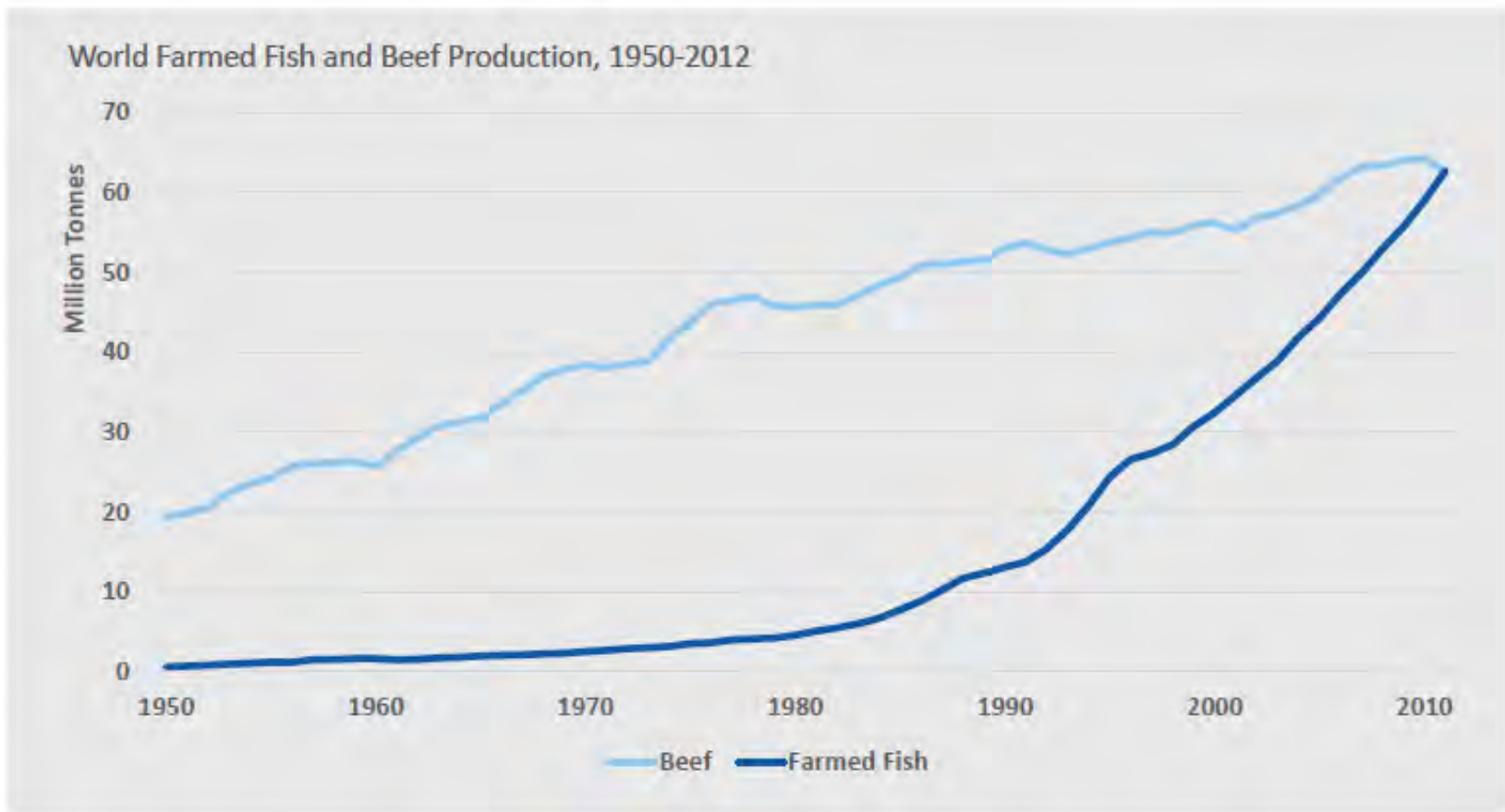
- 70% of agriculture land is used for pasture and grasslands
- 1/3 of crops support animal feed production



Source: UN Environment Programme, Assessing Global Land Use: Balancing Consumption with Sustainable Supply

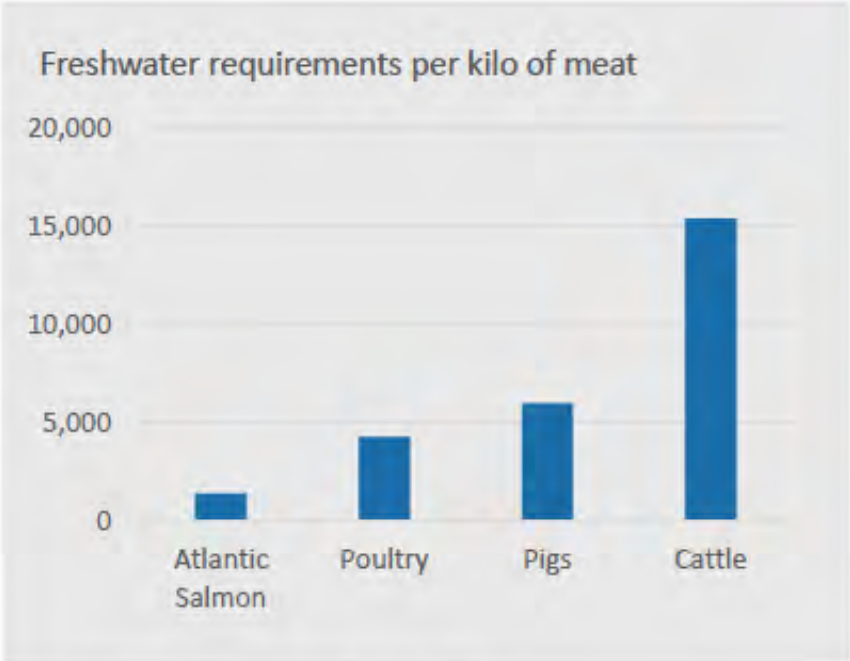
Aquaculture's role

Aquaculture is the only agriculture production system with room to grow



Source: Earth Policy Institute 2013, with data from FAO and USDA.

- Aquaculture is significantly more efficient in terms of land and potable water use
- China and SE Asia have historically had limited land availability and are the largest aquaculture markets

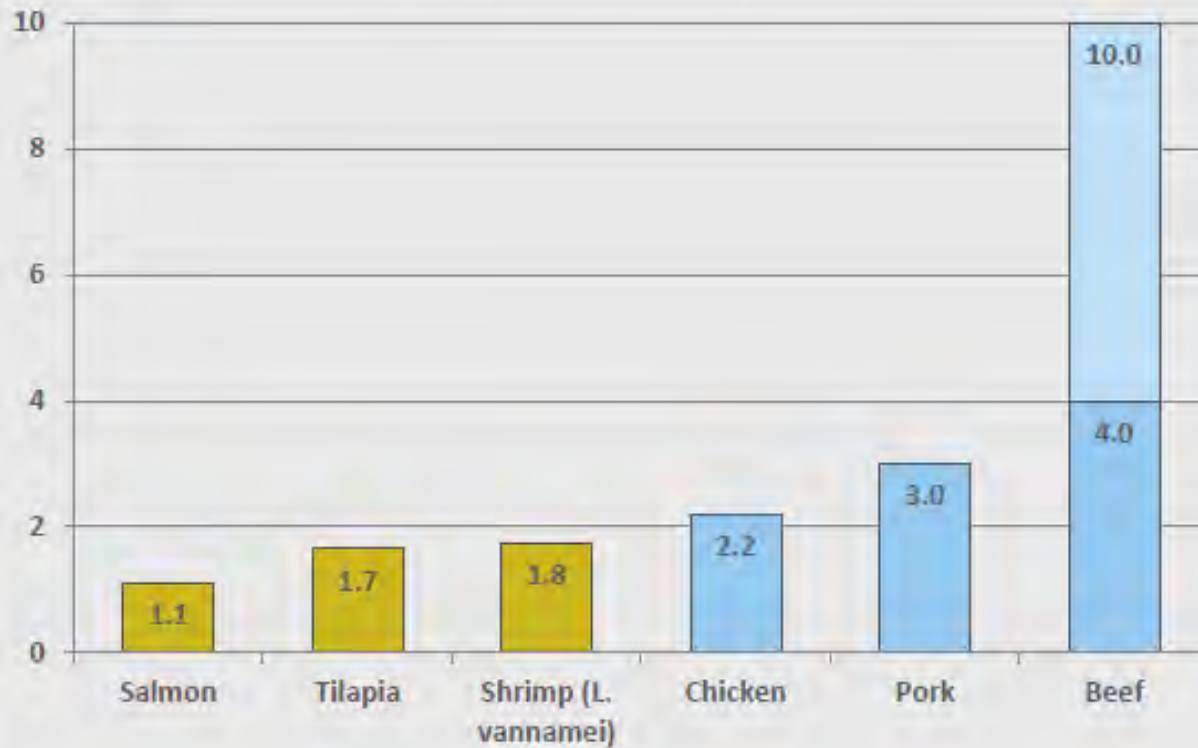


Source: Marine Harvest Industry Handbook 2015.

The Feed Problem

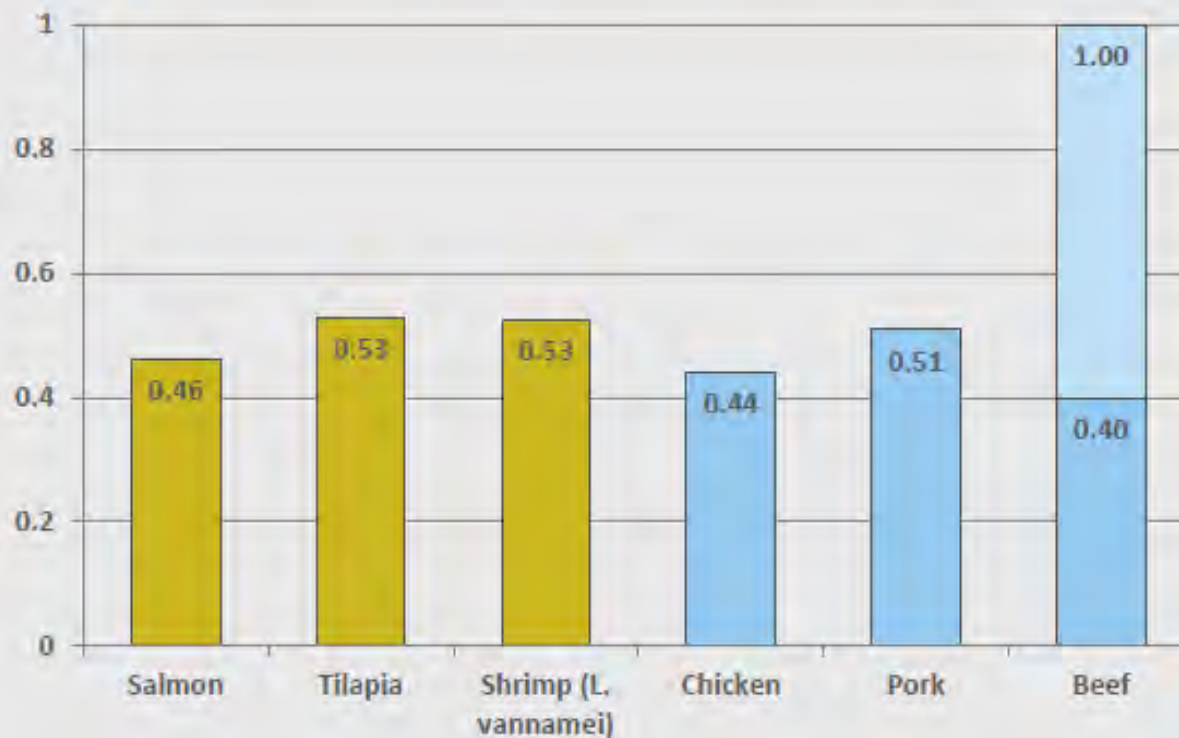
Aquaculture has high efficiency,
but requires high quality feeds

Feed conversion ratios of common livestock and aquaculture species



Source: Marine Harvest Industry Handbook 2015, Hung, L.T. and Quy, O.M. 2013, Texas Aquaculture Extension Service.

Protein conversion ratios of common livestock and aquaculture species



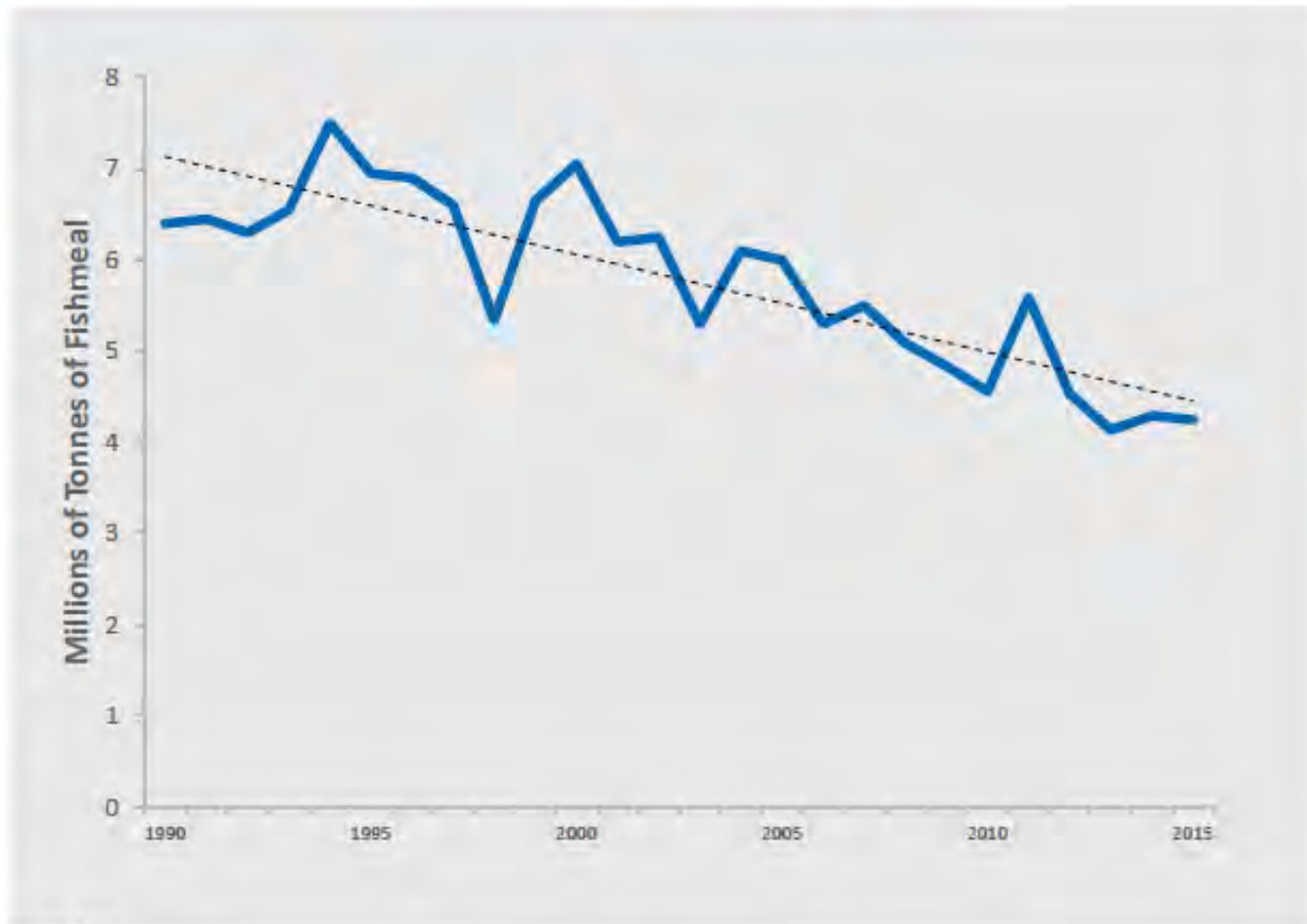
Protein requirements in feed are the Achilles heel of long term aquaculture growth

Source: Marine Harvest Industry Handbook 2015, Hung, L.T. and Quy, O.M. 2013, Texas Aquaculture Extension Service.

Solutions

How do we get from
here to there?

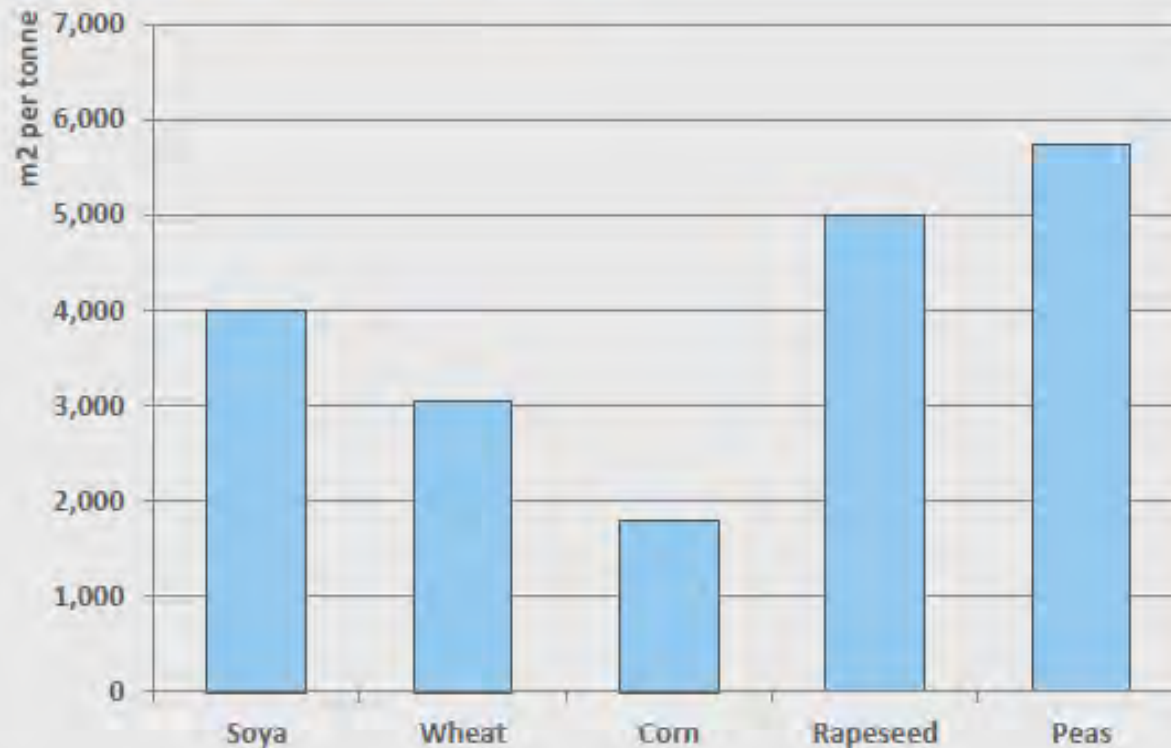
Long term production trend is shrinking by 1% per year



Source: IFFO.

And concentrating the natural protein content doubles or triples this impact

Land required per tonne of output



Source: Carbon Trust.

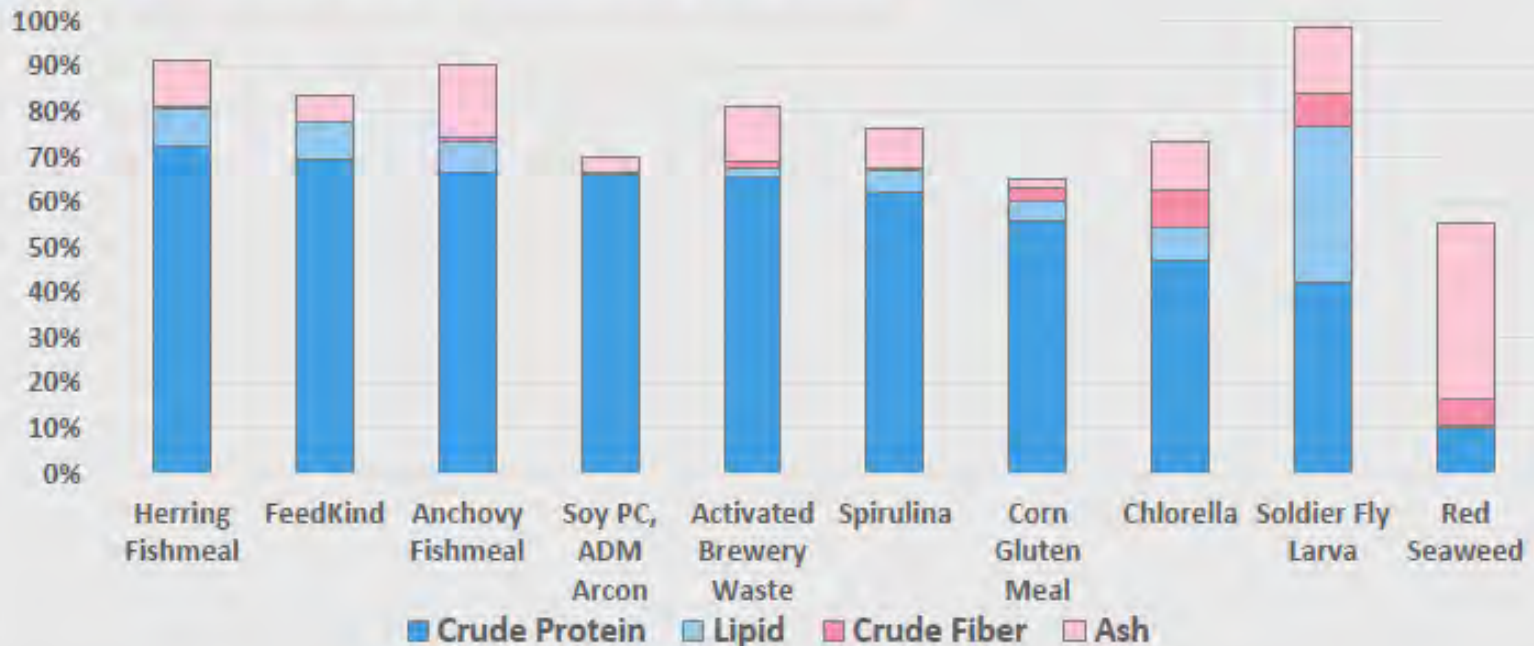
Key attributes of any new feed ingredient:

- High in crude protein or fat, low in fiber, ash and carbohydrates
- Amino acid profile comparable to fishmeal, the best frame of reference for fish nutrition
- Scalable – volumes less than 100,000 tpa don't move the needle nationally or globally
- Minimal demand for new land and water resources
- Highly digestible with supporting data



Many alternatives are plagued by high fiber or inferior amino acid profiles.

Major aquaculture feed ingredients and alternatives



Source: FAO Feed ingredients and fertilizers for farmed aquatic animals, 2009.

- Naturally occurring microorganisms metabolize methane as their sole source of carbon and energy, producing a nutritious, high-protein biomass
- The highest sustainability credentials: little water use, no agricultural land use
- Traceable from production through the supply chain
- Supplied dry as powder or pellets; shelf-life 12 months at ambient temperature
- Existing single cell proteins eaten by millions of people every day: Quorn, Marmite, and Vegemite
- Several thousand tonnes used by EWOS successfully in Atlantic Salmon feeds



FeedKind protein was approved for sale and use in all animal feeds in Europe in 2011

| | | | |
|--------|---|---|---|
| 12.1.2 | Protein from <i>Methylococcus capsulatus</i> (Bath), <i>Alcaligenes acidovorans</i>, <i>Bacillus brevis</i> and <i>Bacillus firmus</i> | Protein product of fermentation with <i>Methylococcus capsulatus</i> (Bath) (NCIMB strain 11132), <i>Alcaligenes acidovorans</i> (NCIMB strain 12387), <i>Bacillus brevis</i> (NCIMB strain 13288) and <i>Bacillus firmus</i> (NCIMB strain 13280) (!) on natural gas (approx. 91 % methane, 5 % ethane, 2 % propane, 0.5 % isobutane, 0.5 % n-butane), ammonia, and mineral salts, the crude protein is at least 65 %. | Crude protein Crude ash Crude fat |
|--------|---|---|---|

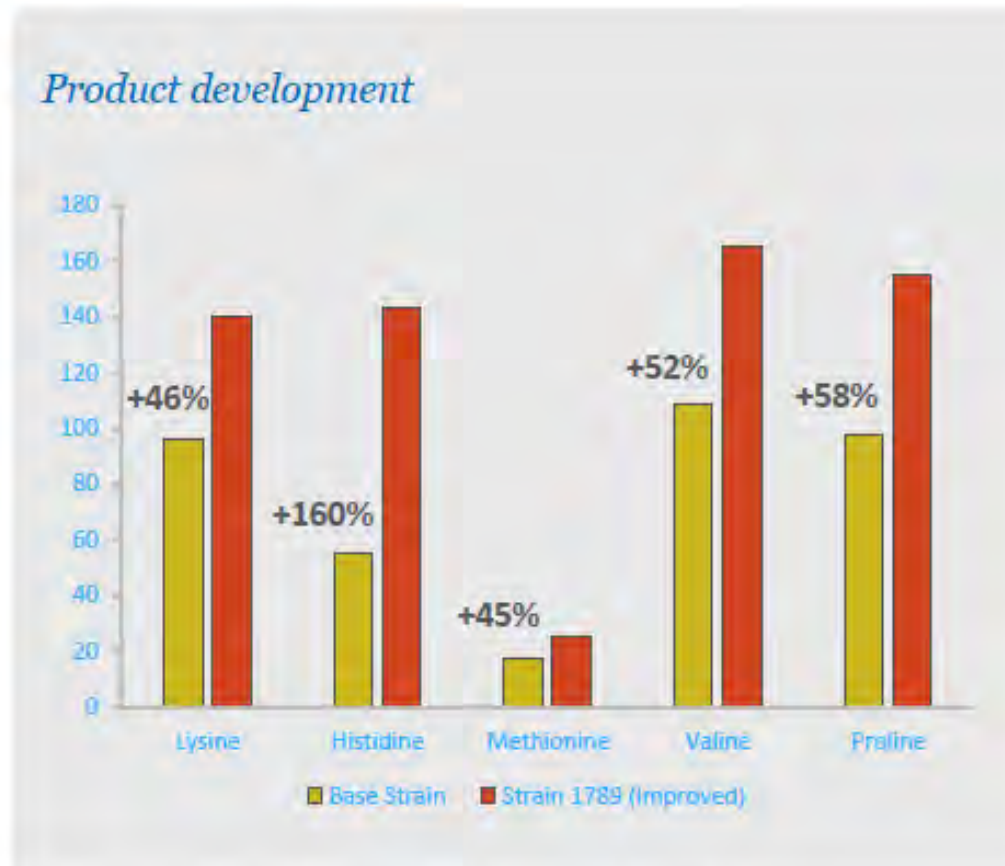
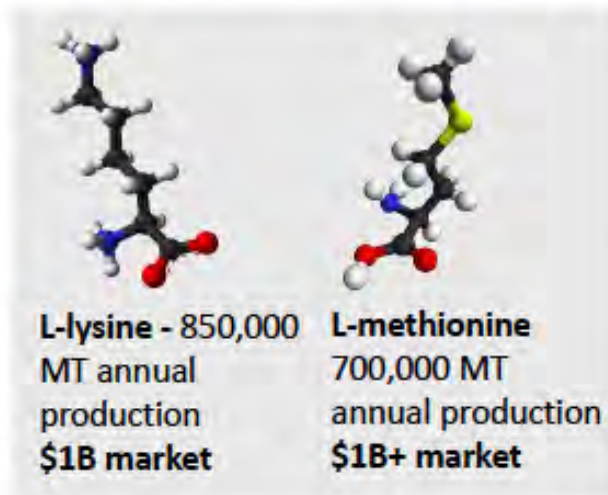


Modular reactor design facilitates scalable construction and new product rollout



Next generation product development is already showing success. Initial work has demonstrated significant improvements:

- Across multiple essential amino acids
- Increases in both total and soluble amino acid content
- Using both non-GMO and GMO methods



Source: Encyclopedia of Industrial Microbiology: Amino Acid Production: L-lysine, 2009.
Methionine Global Outlook: The Next Decade, Novus International, 2008.

Tom Baruch

Executive Chairman

- Founded 8 venture capital funds where he managed over \$1.7B of invested capital at CMEA Ventures and Formation 8.
- Chairman of the Board of Codexis, Inc. (NASDAQ: CDXS) and Intermolecular, Inc. (NASDAQ: IMI).

Alan Shaw

Ph.D. President & CEO

- Executive roles at Codexis (Founder & CEO), Clariant, Chiroscience, AstraZeneca, and ICI.
- Led Codexis initial public offering (Apr 2010) as the leading fuel development partner for Shell
- 2010 E&Y Entrepreneur of the Year.
- Board member and past Chair of BIO Industrial and Environmental Section

Josh Silverman

Ph.D. Chief Technology Officer

- Executive at Avidia, Amgen, and Amunix responsible for product and technology development.
- Early scientific advisor, developing technical, scientific, and business plans at Siluria, Inc.
- Founder at 5 start-up companies and spinouts, ~\$110M in aggregate funding, netting ~\$290M for sale of Avidia in 2005 and \$126M in the IPO of Versartis in 2014.



Dennis Leong

VP Business Development

- Registered professional engineer with a degree in Chemical Engineering from the University of British Columbia.
- More than 25 years of experience in the engineering and construction industry working with leading technology providers.
- Extensive international experience having been based in Canada, Japan, Hong Kong, Singapore, the United Kingdom and the United States.

Graham Ayles

VP Capital Projects

- Chartered professional engineer with over 20 years of capital project delivery in the fine chemical, biotech and pharma industries.
- International experience with ICI, Zeneca, Avecia, Costain, GSK, Pfizer, Anglian Water, and Codexis.
- Advisor to Malaysian Government agencies and Institution of Chemical Engineers.

Ted Hull

CFO and VP Finance

- CFO experience with Fusion-io, TPG owned Isola, and Maxtor
- Global Sales and Operations supporting Top Sales leader at Cisco
- World-wide Manufacturing and Development experience at IBM including the \$8b Storage Division Controller



| Non-Executive Board Members | Advisory Board Members |
|--|--|
| <p>Craig Barratt, Ph.D. Senior Vice President Energy and Access, Google</p> | <p>David Abramson Former President of Martek</p> |
| <p>Nicholas Brathwaite Partner, Walden Riverwood Ventures</p> | <p>William Haseltine Chairman and President of ACCESS Health</p> |
| <p>Torkell Gjerstad President, IRIS-Forskninginvest</p> | <p>Bernhard van Lengerich Former CSO of General Mills</p> |
| <p>Purnesh Seegopaul, Ph.D. General Partner, Pangaea Ventures</p> | <p>David Maki Managing Partner, Altitude Life Sciences Ventures</p> |
| <p>Mike Velings Founder and Managing Partner, Aqua-Spark</p> | <p>Bill Rothwell Former Head of Global R&D at Shell</p> |



Thank You!

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