

Highlights

- Youngest-ever Director of the National Research Council of Canada leading a \$57M R&D program
- Forbes Top 30 Under 30 | 2x TEDx Speaker | Member, Royal Society of Canada
- Carbontech co-founder & finalist (1 of 10 globally) of the \$20M Carbon XPRIZE
- 46 publications in high-impact journals such as *Nature* and *Science* (>8000 citations in the past 5 years)
- Over 8 years of experience in strategic research and development of disruptive technologies

Experience

Director, Materials for Clean Fuels at National Research Council of Canada

Feb 2019 – Present

- Built and launched a 7-year \$57M mission-driven collaborative R&D program focused on disruptive decarbonization technologies. Led the strategic planning, objective setting, and partnership development.
- Manages a research team of >40 FTE in three thrusts – CO₂ recycling, H₂ technology, and artificial intelligence for materials discovery across a portfolio of >25 collaborative research projects with world-leading academics and startups in Canada, UK, Germany, and the US.
- Engages with oil & gas, energy, and chemical industry executives, high-ranking government officials, cleantech entrepreneurs, and technology innovators to align program for deepest impact.
- Contributes to national energy policy strategies around hydrogen and carbon capture, utilization, & storage.

Chairman, Board of Directors at Carbon Management Canada (CMC)

Sep 2019 – Present

- Led a strategic plan exercise and provides key insight and direction to the firm's key value offerings in the carbontech ecosystem. Oversaw board renewal and hiring of the latest CEO.
- Leads the governance of the board and engagement with the management team including setting CEO compensation, approving yearly budgets, and facilitating stakeholder relationship development.

Mentor at Creative Destruction Lab

May 2020 – Present

- Helping early-stage founders build massive and scalable technology companies through technical assessments and entrepreneurial mentorship (mentored >12 startups). Specialization in advanced materials and founding mentor of the Matter (Toronto) and Climate (Paris) streams.

MP Candidate for Toronto-St. Paul's at the Green Party of Canada

May 2021 – Sept 2021

- Federal candidate for the Green Party of Canada in the 2021 Federal election in Toronto-St. Paul's.
- Built and executed a successful campaign, fundraising over \$45,000, managing over 150 volunteers, and touching over 40,000 homes across 90% of the riding. The campaign was covered by media such as CBC, National Observer, City News, and more.
- Finished in the top 5 percentile of Green Party candidates with 2.7x greater vote share than the national average. Earned a prestigious GreenPAC endorsement (1 of only 5 Greens) as a climate champion.

Co-Founder & Finalist at Carbon XPRIZE

Sep 2016 – Mar 2019

- Co-founded a carbontech firm (CERT Systems) that raised >\$2M in non-dilutive funding to develop breakthrough technology to convert CO₂ to ethylene, a critical chemical feedstock with a global market of \$92B. 2019 Creative Destruction Lab – Energy cohort, a highly competitive startup accelerator.
- Brokered partnerships with engineering scale up providers, strategic oil & gas investment, and government funding programs. Led a team to scale up CO₂ conversion technology from bench to prototype.

Research Scientist at Toyota Research Institute

Jun 2018 – Sep 2018

- Worked with researchers at Stanford University to use artificial intelligence to accelerate the discovery of new fuel cell and battery materials. Acceleration factors of >10x traditional experimental discovery was achieved.

Research Scientist at IBM TJ Watson Research Center

May 2016 – Sep 2016

- Developed large-scale simulations to understand biomolecule-material interfaces in the context of point-of-care biosensing applications. Published 4 research papers in high-impact journals over the course of a 4-month internship.

Education

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| 2015 – 2018 | University of Toronto | PhD Materials Science & Engineering |
| 2017 | University of California, Berkeley | Visiting Scholar |
| 2013 – 2015 | University of Ottawa | MSc Chemistry |
| 2009 – 2013 | University of Windsor | BSc [H] Chemistry |

Awards & Recognition

- 2021 Member of the College, Royal Society of Canada
Clean50 Emerging Leader, Clean50
Bay Street Bull 30x30, Bay Street Bull Magazine
 - 2020 Action Canada Fellow, Public Policy Forum
Mission Innovation Champion – Canada, Mission Innovation
 - 2019 Forbes Best of Canada Top 30 Innovators, Forbes
Forbes Top 30 Under 30 – Energy, Forbes
Governor General's Gold Medal, Governor General of Canada
GreenBiz Top 30 Under 30, GreenBiz Magazine
Member, Institute of Corporate Directors
 - 2017 Massey College Catherall Award, Massey College
 - 2016 Michael Smith Foreign Study Supplement, NSERC
Alexander Graham Bell Canada Graduate Scholarship (CGS-D), NSERC
CIFAR Graduate Fellow, Canadian Institute for Advanced Research
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Volunteer Activities

Member, Advanced Materials Steering Committee at the OECD

May 2019 – Present

- Works with other international leaders from Japan, US, European Commission, Korea etc. to provide recommendations and case studies for topics such as best practices for collaborative research platforms and state-of-the-art in carbon capture, utilization, and storage technologies.
- Contributed to OECD policy reports and regularly appears as a guest speaker and panelist and OECD conferences.

Co-Host & Executive Producer at “What’s Next In…” Podcast

Jan 2021 – Present

- Podcast host and producer of “What’s Next In…” a podcast about the rapidly changing world and how we can get ahead of it. Topics include the science and behaviour of climate change, what makes people happy, the future of work, and more. >1000 listens in first 6 weeks of launch.

Member, Sustainable AI Ethics Working Group at the Canadian Commission for UNESCO

Oct 2020 – Present

- Works with the UNESCO secretariat to develop proposals for applying artificial intelligence technology to advance the realization of Canadian UN Sustainable Development Goals.

Mentor, Invention to Innovation (I2I) Program

Jan 2021 – Present

- Provides mentorship to young science-based entrepreneurs regarding getting technologies out of lab and into the marketplace.

Fellow, Action Canada at the Public Policy Forum

Jun 2020 – Mar 2021

- Participated in prestigious Canadian public policy leadership accelerator program (1 of 12 fellows nationally).
- Co-authored a public policy task force report on the future of work in the agriculture sector from a place-based lens with a specific focus on recommendations to decrease barriers for entry for new entrants in agriculture.

Alumni Fellow at Massey College

August 2016 – January 2019

- Participated in a number of committees as an active member in the Massey College Community, an exclusive graduate community focused on multi-disciplinary research excellence at the University of Toronto.
- Served as Co-Chair Junior Fellow Lecture Series, Co-Chair Quarter Century Fund, Lionel Massey Fund Committee Member, Junior Fellow/Senior Fellow Liaison Committee Member, Science at Massey Committee Member, House Committee Member and the Massey Tutors Program High School Tutor.

Graduate Fellow, Canadian Institute for Advanced Research (CIFAR)

September 2015 – January 2019

- Participated as a founding graduate fellow of the Bio-Inspired Solar Energy Program – a collaborative research program bringing the best minds in the world together around new clean energy technologies.
 - Served as meeting co-organizer and meeting recorder.
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Selected Media

VICE Mini-Documentary, *Empowered Episode 2*, Mar. 2020
Forbes x Polestar Video, *“How Phil De Luna is shaping the future of clean energy”*, Jan. 2021
Toronto Star Opinion Editorial, *“If you want a diverse workforce, you need diverse leadership”*, Aug. 2020
Podcast Interviews, *Forbes Ignite, Hot Talks, Pipelines & Turbines, & Foreward – How Stories Drive Change*

Publications**Policy Reports**

1. Growing the Next Crop of Canadian Farmers, *Action Canada Fellowship Report*, Public Policy Forum, Mar 2021.
2. Collaborative platforms for innovation in advanced materials, *OECD Science, Technology, and Industry, Policy Papers*, No. 95, Dec 2020.
3. How Canada Can Meet the Climate Challenge of Net-Zero, *Canadian Science Policy Magazine*, Issue 2, Nov 2020.

Scientific Publications (* denotes equal contribution)

1. Cao, X. E. & De Luna, P. Why we need scientists to make sustainable policies. *Matter*, 2021, 4(9), 2690-2693
 2. Hui, S., & De Luna, P. How increasing proton and electron conduction benefits electrocatalytic CO₂ reduction. *Matter*, 2021, 4(5), 1555-1577
 3. Wen, Y., Chen, P., Wang, L., Li, S., Wang, Z., Abed, J., Mao, X., Min, Y., Dinh, C.T., De Luna, P. Huang, R., Zhang, L., Wang, L., Wang, L., Nielsen, R.J., Li, H., Zhuang, T., Ke, C., Voznyy, O., Hu, Y., Li, Y., Goddard III, W.A., Zhang, B., Peng, H., Sargent, E.H. Stabilizing Highly Active Ru Sites by Suppressing Lattice Oxygen Participation in Acidic Water Oxidation. *Journal of the American Chemical Society*, 2021, 143, 17, 6482-6490
 4. Zhong, M.,* Tran, K.,* Min, Y.,* Wang, C.,* Wang, Z., Dinh, C. T., De Luna, P., Yu, Z., Rasouli, A. S., Brodersen, P., Sun, S., Voznyy, O., Tan, C. S., Askerka, M., Che, F., Liu, M., Seifitokaldani, A., Pang, Y., Lo, S. C., Ip, A., Ulissi, Z., & Sargent, E. H. Accelerated discovery of CO₂ electrocatalysts using active machine learning. *Nature*, 2020, 581, 178-183
 5. Nam, D. H.,* De Luna, P.,* Rosas-Hernandez, A., Thevenon, A., Li, F., Agapie, T., Peters, J. C., Shekhah, O., Eddaoudi, M., & Sargent, E. H. Molecular enhancement of heterogeneous CO₂ reduction. *Nature Materials*, 2020, 19, 226-276
 6. Zhang, B., Wang, L., Cao, Z., Kozlov, S. M., Garcia de Arquer, F. P., Dinh, C. T., Li, J., Wang, Z., Zheng, X., Zhang, L., Wen, Y., Voznyy, O., Comin, R., De Luna, P., Reiger, T., Bi, W., Alp, E. E., Pao, C. W., Zheng, L., Hu, Y., Ji, Y., Li, Y., Zhang, Y., Cavallo, L., Peng, H., Sargent, E. H. High-valence metals improve oxygen evolution reaction performance by modulating 3 d metal oxidation cycle energetics. *Nature Catalysis*, 2020, 3, 985-992
 7. Coskun, H., Aljabour, A., De Luna, P., Sun, H., Nishiumi, N., Yoshida, T., Koller, G., Ramsey, M. G., Greunz, T., Stiffer, D., Strobel, M., Hild, S., Hassel, A. W., Sariciftci, N. S., Sargent E. H., & Stadler, P. Metal-Free Hydrogen-Bonded Polymers Mimic Noble Metal Electrocatalysts. *Advanced Materials*, 2020, 32(25)
 8. Hui, S., Shaigan, N., Neburchilov, V., Zhang, L., Malek, K., Eikerling, M., & De Luna, P. Three-Dimensional Cathodes for Electrochemical Reduction of CO₂: From Macro- to Nano-Engineering. *Nanomaterials*, 2020, 10(9), 1884
 9. De Luna, P., Hahn, C., Higgins, D., Jaffer, S. A., Jaramillo, T. F., & Sargent, E. H. What would it take for renewably powered electrosynthesis to displace petrochemical processes? *Science*, 2019, 364, 6438
 10. Ross, M. B., De Luna, P., Li, Y., Dinh, C. T., Kim, D., Yang, P., & Sargent E. H. Designing materials for electrochemical carbon dioxide recycling. *Nature Catalysis*, 2019, 2, 648-658
 11. Liu, M., Liu, M., Wang, X., Kozlov, S. M., Cao, Z., De Luna, P., Li, H., Qui, X., Liu, K., Hu, J., Jia, C., Wang, P., Zhou, H., He, J., Zhong, M., Lan, X., Zhou, Y., Wang, Z., Li, J., Seifitokaldani, A., Dinh, C. T., Liang, H., Zou, C., Zhang, D., Yang, Y., Chan, T. S., Han, Y., Cavallo, L., Sham, T. K., Hwang, B. J., & Sargent, E. H. Quantum-Dot-Derived Catalysts for CO₂ Reduction Reaction. *Joule*, 2019, 3, 1-16
 12. Duan, G., Chen, L., Jing, Z., De Luna, P., Wen, L., Zhang, L., Zhao, L., Xu, J., Li, Z., Yang, Z., & Ruhong, Z. Robust Antibacterial Activity of Tungsten Oxide (WO_{3-x}) Nanodots. *Chemical Research in Toxicology*, 2019, 32(7), 1357-1366
 13. Nandi, S., De Luna, P., Maity, R., Chakraborty, D., Daff, T. D., Burns, T. D., Woo, T. K., Ramanathan, V. Imparting Gas Selective and Pressure Dependent Porosity into a Non-Porous Solid via Coordination Flexibility. *Materials Horizons*, 2019, 6, 1883-1891
 14. Pang, Y., Li, J., Wang, Z., Tan, C. S., Hsieh, P. L., Zhuang, T. T., Liang, Z. Q., Zou, C., Wang, X., De Luna, P., Edwards, J. P., Xu, Y., Li, F., Dinh, C. T., Zhong, M., Lou, Y., Wu, D., Chen, L. J., Sargent, E. H., & Sinton, D. Efficient electrocatalytic conversion of carbon monoxide to propanol using fragmented copper. *Nature Catalysis*, 2018, 2, 251-258
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15. Dinh, C. T.,* Jain, A.,* de Arquer, F. P. G.,* **De Luna, P.**, Wang, N., Zheng, X., Cai, J., Gregory, B. Z., Voznyy O., Zhang, B., Liu, M., Sinton, D., Crumlin, E. J., & Sargent, E. H. Multi-Site Catalysts Destabilize Water Molecules and Achieve High-Activity Neutral Hydrogen Evolution. *Nature Energy*. 2018, 4, 107-114
 16. Li, J.,* Che, F.,* Pang, Y.,* Zou, C.,* Howe, J. Y., Burdynyn, T., Edwards, J. P., Wang, Y., Li, F., **De Luna, P.**, Dinh, C. T., Zhuang, T. T., Saidaminov, M. I., Cheng, S., Wu, T., Finprock, Y. Z., Ma, L., Hsieh, S. H., Liu, Y., Botton, G., Pong, W. F., Du, X., Guo J., Sham, T. K., Sargent, E. H., & Sinton, D. Copper adparticle enabled selective electrosynthesis of n-propanol. *Nature Communications*. 2018, 9, 4614
 17. Zhuang, T. T.,* Pang, Y.,* Liang, Z. Q., Li, Y., Tan, C. S., Li, J., Din, C. T., **De Luna, P.**, Hsieh, P. L., Burdyny, T., Li, H. H., Liu, M., Wang, Y., Li, F., Proppe, A., Johnston, A., Wu, Z. Y., Zheng, Y. R., Ip, A. H., Tan, H., Chen, L. J., Yu, S. H., Kelly, S. O., Sinton, D., & Sargent, E. H. Copper nanocavities confine intermediates for efficient electrosynthesis of C3 alcohol fuels from carbon monoxide. *Nature Catalysis*. 2018, 1, 945-951
 18. Ross, M. B., Li, Yi., **De Luna, P.**, Kim, D., Sargent, E. H., & Yang, P. Electrocatalytic Rate Alignment Enhances Syngas Generation. *Joule*. 2018, 3 (1), 257-264
 19. Kibria, M. G., Dinh, C. T., Seifitokaldani, A., **De Luna, P.**, Burdyny, T., Quintero-Bermudez, R., Ross, M. B., Bushuyev, O. S., de Arquer, F. P. G., Yang, P., Sinton, D., & Sargent, E. H. A Surface Reconstruction Route to High Productivity and Selectivity in CO₂ Electroreduction Toward C₂₊ Hydrocarbons. *Advanced Materials*. 2018, 30 (49), 1804867
 20. Liang, Z.,* Zhuang, T.,* Seifitokaldani, A., Tan C. S., Li, Y., **De Luna, P.**, Huang, C. W., Hsieh, P. L., Dinh, C. T., Wang, Y., Quintero-Bermudez, R., Zhou, Y., Li, J., Chen, P., Pang, Y., Lo, S. C., Chen, L. J., Tan, H., Xu, Z., Zhao, S., & Sargent, E. H. Copper-on-nitride enhances the stable electrosynthesis of multi-carbon products from CO₂. *Nature Communications*. 2018, 9, 3828
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 23. Garcia de Arquer, F. P.,* Bushuyev, O. S.,* **De Luna, P.**,* Dinh, C. T., Seifitokaldani, A., Saidaminov, M. I., Quan, L. N., Proppe, A., Kibria, M. G., Kelley, S., Sinton, D., & Sargent, E. H. 2D Metal Oxyhalide-Derived Catalysts for Efficient CO₂ Electroreduction. *Advanced Materials*. 2018, 1802858
 24. Zhou, Y.,* Che, F.,* Liu, M.,* Zou, C., Liang, Z.Q., **De Luna, P.**, Yuan, H., Li, J., Wang, Z., Chen, P., Bladt, E., Quintero-Bermudez, R., Sham, T. K., Bals, S., Hofkens, J., Sinton, D., Chen, G., & Sargent, E. H. Dopant-induced electron localization drives CO₂ reduction to C₂ hydrocarbons. *Nature Chemistry*. 2018, 10, 974–980
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 26. Dinh, C. T.,* Burdyny, T.,* Kibria, M.,* Seifitokaldani, A.,* Gabardo, C., de Arquer, F. P. G., Kiani, A., Edwards, J., **De Luna, P.**, Bushuyev, O., Zou, C., Quintero-Bermudez, R., Pang, Y., Sinton, D., & Sargent E. H. Sustained high-selectivity CO₂electroreduction to ethylene via hydroxide-mediated catalysis at an abrupt reaction interface. *Science*. 2018, 360 (6390), 783-787
 27. He, S., Zhang, Y., Qiu, L., Zhang, L., Zhang B., Xie, Y., Pan, J., Chen, P., Song, H., Hu, Y., Wang, B., Dinh, C. T., **De Luna, P.**, Banis, M. N., Wang, Z., Sham, T. K., Gong, X., Peng, H., Sargent, E. H. Chemical-to-Electricity Carbon: Water Device. *Advanced Materials*. 2018, 1707635
 28. Bushuyev, O.S.* **De Luna, P.*** Dinh, C.T., Tao, L., Saur, G., van de Lagemaat, J., Kelley, S. O., Sargent, E.H. What should we make with CO₂ and how can we make it? *Joule*. 2018, 2 (5), 825-832
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