Matthew J. Gidden, Ph.D.

CONTACT INFORMATION	Laimgrubengasse 17/7 Vienna, 1060 Austria	*Mobile:* +43 (0)6 676 175 3442 *E-mail:* matthew.gidden@gmail.com *Website:* mattgidden.com *Github:* gidden

CITIZENSHIP   USA

RESEARCH INTERESTS   Energy systems, energy policy, scientific computation, nuclear fuel cycle analysis, agent-based modeling, advanced nuclear reactors, nuclear nonproliferation

EDUCATION

PH.D., *Nuclear Engineering*, **University of Wisconsin - Madison**   **March 2015**
- An Agent-Based Modeling Framework and Application for the Generic Nuclear Fuel Cycle
- Advisor: Professor Paul P.H. Wilson

MASTERS, *Nuclear Engineering*, **University of Wisconsin - Madison**   **December 2011**

B.S., *Nuclear Engineering*, **Texas A&M University**   **May 2009**
- *Summa cum Laude*, With Honors in Engineering
- Minor in Mathematics

RESEARCH EXPERIENCE

International Institute for Applied Systems Analysis, Energy Group, Laxenburg, AUSTRIA
Oct 2015 – Present
Research Scholar
Develop and use MESSAGEix, a global Integrated Assessment Model, to perform large-scale comprehensive Land-Energy-Water Nexus analyses; develop common tools and procedures used by the global IAM community; perform GIS-based spatial modeling and analysis.

University of Wisconsin, NE Dept., Madison, WI   **Apr – Oct 2015**
Postdoctoral Researcher
Investigated novel methods for modeling recycle fuel fabrication in NFC simulations.

University of Wisconsin, NE Dept., Madison, WI   **Aug 2010 – Mar 2015**
Graduate Research Assistant   **Aug 2009 – Jan 2010**
Developed and extended the Cyclus NFC simulator to model generic nuclear fuel cycles.

AREVA, Paris, FRANCE   **Feb – Jul 2010**
Research Intern (Stagiaire), Core Design Group
Simulated and analyzed a boron dilution accident in multiple reactor configurations using MCNP.

Pacific Northwest National Lab, Richland, WA   **Jun – Aug 2009**
Research Assistant
Analyzed a design of an automated verification unit for canisters of enriched UF_6 using MCNP.

TN International (AREVA), Montigny-le-Bretonneux, FRANCE   **Jun – Aug 2008**
Research Intern, Materials Group
Analyzed material suitability for nuclear cask shock absorber via dynamic compression testing.

Oak Ridge National Lab, Oak Ridge, TN   **Jun – Aug 2007**
Research Assistant   **Jun – Aug 2006**
Tested the collimation of radiation portal monitors for use with the U.S. Megaports Initiative.

HONORS & AWARDS	2nd Place in Energy Policy, Innovations in Fuel Cycle Research	**2014**
	Winner, The Why Files Cool Science Image Contest	**2014**
	Nuclear Energy University Program Graduate Research Fellowship	**2010 – 2013**
	American Nuclear Society Graduate Scholarship	**2013**
	Nuclear Regulatory Commision Undergraduate Scholarship	**2008 – 2009**
	President's Endowed Scholarship, Texas A&M University	**2005 – 2009**
	Stinson Scholarship, Texas A&M University	**2005 – 2009**

PROFESSIONAL ORGANIZATIONS & SERVICE	**Elsevier Energy Forum**, Member	**2017 – Present**
	European Geosciences Union, Member	**2016 – Present**
	Institute for Operations Research and Management Science, Member	**2014 – Present**
	American Nuclear Society, Member	**2006 – Present**
	Communications Committee, Member	**2013 – Present**
	Public Policy Committee, Member	**2013 – Present**
	Special Advisory Committee on Nuclear Nonproliferation, Member	**2012 – 2016**
	Student Sections Committee, Member	**2010 – 2016**
	Local Sections Committee, Member	**2010 – 2012**
	Nuclear Nonproliferation Special Committee, Member	**2010 – 2012**
	ANS Student Conference, Co-Chair	**2008**
	Institute of Nuclear Materials Management, Member	**2008 – Present**
	Alpha Nu Sigma, Member	**2009 – Present**
	Nuclear Engineering Student Delegation, Delegate	**2011 – 2013**
	Chair	**2013**
	Vice Chair	**2012**
	American Nuclear Society, Texas A&M Chapter, Member	**2005 – 2009**
	Vice President	**2006 – 2007**

TEACHING EXPERIENCE	**European Geoscience Union General Assembly 2017**, Vienna, Austria	**April 27, 2017**
	Working with big, multi-dimensional geoscientific datasets in Python: a tutorial introduction to xarray	
	Open Energy Modeling Workshop, Frankfurt, Germany	**April 19 – 21, 2017**
	Introduction to Scientific Programming in Python	
	African Institute for Mathematical Sciences (AIMS)	**Aug 31 – Sept 11, 2015**
	Structured Master's in Mathematical Sciences, Cape Town, South Africa	
	Scientific Computation with Python	
	University of Wisconsin Advanced Computing Initiative, Madison, WI	**Aug 26 – 27, 2015**
	Software Carpentry: Version Control with Git	
	University of Wisconsin Advanced Computing Initiative, Madison, WI	**Jan 13 – 16, 2015**
	Software Carpentry: Version Control	
	University of Wisconsin Advanced Computing Initiative, Madison, WI	**Aug 25 – 26, 2014**
	Software Carpentry: Version Control and Unit Testing	
	University of Wisconsin Advanced Computing Initiative, Madison, WI	**Aug 28 – 29, 2013**
	Software Carpentry: Version Control	
	University of Wisconsin Advanced Computing Initiative, Madison, WI	**Apr 29 – 30, 2013**
	Software Carpentry: Version Control and Unit Testing	

COMPUTATIONAL SKILLS

I have deep and broad software development skills and experience. I help maintain and manage a number of open source scientific software packages including MESSAGEix, pyam, aneris, Cyclus, and PyNE.

EXPERT (5+ YEARS EXPERIENCE)

Languages	C++/C, Python
Optimization	pyomo, GAMS
Build Systems	CMake, Make, Autoconf/Automake
Version Control	Git
Tools	LaTeX, Doxygen, Jekyll, JSON, Sphinx, XML
Database Formats	SQL, HDF5, NetCDF
Test Frameworks	GoogleTest, PyTest, Nose
NE Applications	MCNP, Origen
Other Applications	Jupyter (Notebooks, Slides, etc.)

FAMILIAR

Languages	R, Java, FORTRAN, Visual Basic, Perl
Version Control	Mercurial, Subversion
Other Applications	Matlab, Mathcad, Mathematica, Maple

JOURNAL PUBLICATIONS

[1] **Gidden, M. J.** Fujimori, S. Berg, M. Klein, D. Smith, S. J. Vuuren, D. P. Riahi, K., "Global emissions pathways under different socioeconomic scenarios for use in cmip6: A dataset of harmonized regional and country-level emissions trajectories through the end of the century," *Geoscientific Model Development (in preparation)*,

[2] **Gidden, M. J.** Rao, N. D. Parkinson, S. C. Riahi, K., "Spatially explicit urban and rural poverty estimates under different global socioeconomic futures," *Nature Scientific Data (in preparation)*,

[3] Parkinson, S. **Gidden, M. J.** Riahi, K., "Quantifying interactions between sdg6 and a 1.5 degree c climate policy," *Nature Sustainability (in review)*,

[4] Kriegler, E. **Gidden, M. J.** Riahi, K., "Taking stock of climate policies: Evaluation of national policies in the context of the paris agreement climate goals," *Nature Climate Change (in review)*,

[5] Krey, V. **Gidden, M. J.** Riahi, K., "Implications of the paris agreement for achieving the sustainable development goals," *Nature Climate Change (in review)*,

[6] Rao, N. D. Sauer, P. **Gidden, M. J.** Riahi, K., "Income inequality projections for the Shared Socioeconomic Pathways," *Futures (in press)*,

[7] Bauer, N. Rose, S. K. Fuminori, S. Vuuren, D. P. Weyant, J. Wise, M. Cui, Y. Daioglou, V. **Gidden, M.** Kato, E. Kitous, A. Leblanc, F. Sands, R. Sano, F. Strefler, J. Tsutsui, J. Bibas, R. Hasegawa, T. Klein, D. Kurosawa, A. Muratori, M., "Global energy sector emission reductions and bioenergy use: Overview of the bioenergy demand phase of the emf 33 model comparison," *Climatic Change (in press)*,

[8] Huppmann, D. **Gidden, M. J.** Fricko, O. Kolp, P. Orthofer, C. Pimmer, M. Vinca, A. Krey, V., "The messageix integrated assessment model and the ix modeling platform (ixmp)," *Environmental Modelling & Software (in press)*,

[9] McCollum, D. L. Zhou, W. Bertram, C. Boer, H.-S. Bosetti, V. Busch, S. Després, J. Drouet, L. Emmerling, J. Fay, M. Fricko, O. Fujimori, S. **Gidden, M.** Harmsen, M. Huppmann, D. Iyer, G. Krey, V. Kriegler, E. Nicolas, C. Pachauri, S. Parkinson,

S. Poblete-Cazenave, M. Rafaj, P. Rao, N. Rozenberg, J. Schmitz, A. Schoepp, W. Vuuren, D. Riahi, K., "Energy investment needs for fulfilling the paris agreement and achieving the sustainable development goals," *Nature Energy*, 2018, ISSN: 2058-7546. DOI: 10.1038/s41560-018-0179-z. [Online]. Available: https://doi.org/10.1038/s41560-018-0179-z

[10] Grubler, A. Wilson, C. Bento, N. Boza-Kiss, B. Krey, V. McCollum, D. L. Rao, N. D. Riahi, K. Rogelj, J. De Stercke, S. Cullen, J. Frank, S. Fricko, O. Guo, F. **Gidden, M.** Havlík, P. Huppmann, D. Kiesewetter, G. Rafaj, P. Schoepp, W. Valin, H., "A low energy demand scenario for meeting the 1.5° C target and sustainable development goals without negative emission technologies," *Nature Energy*, vol. 3, no. 6, pp. 515–527, 2018, ISSN: 2058-7546. DOI: 10.1038/s41560-018-0172-6. [Online]. Available: https://doi.org/10.1038/s41560-018-0172-6

[11] Byers, E. A. **Gidden, M.** Leclère, D. Burek, P. Ebi, K. L. Greve, P. Grey, D. Havlik, P. Hillers, A. Johnson, N. Kahil, T. Krey, V. Langan, S. Nakicenovic, N. Novak, R. Obersteiner, M. Pachauri, S. Palazzo, A. M. Parkinson, S. Rao, N. D. Rogelj, J. Riahi, K. Satoh, Y. Wada, Y. Willaarts, B., "Global exposure and vulnerability to multi-sector development and climate change hotspots," *Environmental Research Letters*, 2018. [Online]. Available: http://iopscience.iop.org/10.1088/1748-9326/aabf45

[12] Liu, L. Parkinson, S. **Gidden, M.** Byers, E. Satoh, Y. Riahi, K. Forman, B., "Quantifying the potential for reservoirs to secure future surface water yields in the world's largest river basins," *Environmental Research Letters*, vol. 13, no. 4, p. 044 026, 2018. [Online]. Available: http://stacks.iop.org/1748-9326/13/i=4/a=044026

[13] **Gidden, M. J.** Fujimori, S. Berg, M. Klein, D. Smith, S. J. Vuuren, D. P. Riahi, K., "A methodology and implementation of automated emissions harmonization for use in integrated assessment models," *Environmental Modelling & Software*, vol. 105, pp. 187 –200, 2018, ISSN: 1364-8152. DOI: https://doi.org/10.1016/j.envsoft.2018.04.002. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1364815217307867

[14] Pfenninger, S. Hirth, L. Schlecht, I. Schmid, E. Wiese, F. Brown, T. Davis, C. **Gidden, M.** Heinrichs, H. Heuberger, C. Hilpert, S. Krien, U. Matke, C. Nebel, A. Morrison, R. Müller, B. Pleßmann, G. Reeg, M. Richstein, J. C. Shivakumar, A. Staffell, I. Tröndle, T. Wingenbach, C., "Opening the black box of energy modelling: Strategies and lessons learned," *Energy Strategy Reviews*, ISSN: 2211-467X. DOI: 10.1016/j.esr.2017.12.002. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S2211467X17300809 (visited on 01/02/2018)

[15] **Gidden, M. J.** Wilson, P. P., "A methodology for determining the dynamic exchange of resources in nuclear fuel cycle simulation," *Nuclear Engineering and Design*, pp. –, 2016, ISSN: 0029-5493. DOI: http://dx.doi.org/10.1016/j.nucengdes.2016.10.029. [Online]. Available: http://www.sciencedirect.com/science/article/pii/S0029549316304101

[16] Huff, K. D. **Gidden, M. J.** Carlsen, R. W. Flanagan, R. R. McGarry, M. B. Opotowsky, A. C. Schneider, E. A. Scopatz, A. M. Wilson, P. P., "Fundamental concepts in the cyclus nuclear fuel cycle simulation framework," *Advances in Engineering Software*, vol. 94, pp. 46 –59, 2016, ISSN: 0965-9978. DOI: http://dx.doi.org/10.1016/j.advengsoft.2016.01.014. [Online]. Available: http://www.sciencedirect.com/science/article/pii/S0965997816300229

[17] Pearce, T. M. Williams, J. J. Kruzel, S. P. **Gidden, M. J.** Williams, J. C., "Dynamic control of extracellular environment in in vitro neural recording systems," *Neural Systems*

and Rehabilitation Engineering, IEEE Transactions on, vol. 13, no. 2, pp. 207–212, 2005

INVITED TALKS & PRESENTATIONS

[18] **Gidden, M.**, *Messageix: Cutting edge research and challenges*, Centre National de la Recherche Scientifique (CNRS) Summer School: Integrated Assessment Modeling, Jun. 2018

[19] **Gidden, M.**, *Insights from scenarios targeting the paris agreement*, United Nations Climate Change Conference (COP23), EU Pavilion, Bonn, Germany, Nov. 2017

[20] **Gidden, M.**, *Developing future socioeconomic and greenhouse gas emission scenarios*, United Nations Climate Change Conference (COP23), UK Pavilion, Bonn, Germany, Nov. 2017

[21] **Gidden, M.**, *Emissions pathways for climate modeling: harmonizing the ssps to cmip6 historical data*, CRESCENDO General Assembly, Paris, France, Sep. 2017

[22] **Gidden, M.**, *Exploring nuclear fuel cycle simulation using htcondor*, HTCondor Week, Madison, WI, May 2015

REFEREED PROCEEDINGS

[23] **Gidden, M.** Wilson, P., "Dynamic resource exchange with coinor-cbc in cyclus, a nuclear fuel cycle simulator," in *Operations Research and Computing: Algorithms and Software for Analytics*, Richland, VA, United States, Jan. 2015

[24] **Gidden, M.** Carlsen, R. Opotowsky, A. Rakhimov, O. Scopatz, A. Wilson, P., "Agent-based dynamic resource exchange in cyclus," in *Proceedings of PHYSOR*, Kyoto, Japan, Sep. 2014

[25] **Gidden, M.** Wilson, P., "An agent-based framework for fuel cycle simulation with recycling," in *Proceedings of GLOBAL*, Salt Lake City, UT, United States, Sep. 2013

CONFERENCE PUBLICATIONS

[26] **Gidden, M. J.** Byers, E. Burek, P. Ebi, K. Greve, P. Havlik, P. Johnson, N. Kahil, T. Krey, V. Langan, S. Leclère, D. Obersteiner, M. Palazzo, A. Pachauri, S. Parkinson, S. Rao, N. Rogelj, J. Satoh, Y. Wada, Y. Willaarts, B. Riahi, K., "A global assessment of exposure and vulnerability to energy, water, and land climate change hotspots," in *The 37th Edition of International Energy Workshop*, Jun. 2018

[27] **Gidden, M. J.** et al., "Exposure and vulnerability to energy, water, and land hotspots under different climate futures," in *Tenth Integrated Assessment Modelling Consortium Meeting*, Dec. 2017

[28] **Gidden, M. J.** et al., "Emissions pathways for climate modeling: harmonizing the ssps to cmip6 historical data," in *Tenth Integrated Assessment Modelling Consortium Meeting*, Dec. 2017

[29] **Gidden, M. J.** Huppmann, D., "Diagnostics and analysis of iam results: presenting the pyam-analysis package," in *Tenth Integrated Assessment Modelling Consortium Meeting*, Dec. 2017. [Online]. Available: http://mattgidden.com/presentations/pyam-iamc2017

[30] **Gidden, M. J.** Byers, E. Greve, P. Kahil, T. Parkinson, S. Raptis, C. Rogelj, J. Satoh, Y. Vliet, M. Wada, Y. Krey, V. Langan, S. Riahi, K., "Hydroclimatic risks and uncertainty in the global power sector," in *European Geosciences Union General Assembly*, Vienna, Austria, Apr. 2017

[31] **Gidden, M. J.** Huppmann, D. Krey, V. Fricko, O. Kolp, P. Riahi, K., "The new MESSAGE$_{ix}$ Modeling Platform," in *Open Energy Modelling Workshop*, Frankfurt, Germany, Apr. 2017

[32] **Gidden, M. J.** Parkinson, S. C. Rao, N. D. Riahi, K., "Spatial Downscaling of Urban and Rural Income and Inequality for the Shared Socioeconomic Pathways," in *Ninth Annual Meeting of the IAMC 2016*, Beijing, China, Dec. 2016

[33] **Gidden, M.** Wilson, P., "Dynamic resource exchange performance in cyclus," in *Transactions of the American Nuclear Society*, San Antonio, TX, United States, Jun. 2015

[34] Carlsen, R. W. **Gidden, M. J.** Wilson, P. P., "Deployment Optimization with the CY-CLUS Fuel Cycle Simulator," in *Transactions of the American Nuclear Society*, DOI link for code, methods, etc: http://dx.doi.org/10.6084/m9.figshare.1086284, vol. 111, Anaheim, CA, Nov. 2014, pp. 241–244

[35] Biondo, E. Scopatz, A. **Gidden, M.** Slaybaugh, R. Bates, C. WIlson, P. P., "Quality Assurance within the PyNE Open Source Toolkit," in *Transactions of the American Nuclear Society*, vol. 111, Anaheim, CA, Nov. 2014. [Online]. Available: https://github.com/pyne/ans-winter-2014-vnv

[36] **Gidden, M.** Wilson, P. Scopatz, A., "Developing standardized, open benchmarks and a corresponding specification language for the simulation of dynamic fuel cycles," in *Proceedings of the 2013 ANS Summer Conference*, Atlanta, GA, United States, Jun. 2013

[37] **Gidden, M.** Wilson, P. Huff, K. Carlsen, R., "Once-through benchmarks with cyclus, a modular, open-source fuel cycle simulator," in *Proceedings of the 2012 ANS Winter Conference*, San Diego, CA, Nov. 2012

[38] **Gidden, M.** Wilson, P. Huff, K., "Once-through benchmarks with cyclus," in *ANS Student Conference*, Las Vegas, NV, 2011

[39] Huff, K. D. Wilson, P. P. **Gidden, M. J.**, "Open Architecture and Modular Paradigm of Cyclus, a Fuel Cycle Simulation Code," in *Transactions of the American Nuclear Society*, vol. 104, 2011, p. 183

[40] Huff, K. Wilson, P. **Gidden, M.** Elmore, R., *Cyclus : An Open, Modular, Next Generation Fuel Cycle Simulator Platform*, Poster, Mar. 2011

[41] **Gidden, M.** Livesay, J. York, R. Blessinger, C., "Collimation of radiation portal monitors to reduce the innocent alarm rate (poster)," in *Transactions of the American Nuclear Society*, Washington, DC, Nov. 2007

OTHER PUBLICATIONS

[42] Wilson, P. P. H. Scopatz, A. **Gidden, M.** Carlsen, R. Mouginot, B. Flanagan, R., *Market-Based and System-Wide Fuel Cycle Optimization*. 2017. [Online]. Available: http://www.osti.gov/scitech/servlets/purl/1363866

[43] Krey, V. Havlik, P. Fricko, O. Zilliacus, J. **Gidden, M.** Strubegger, M. Kartasasmita, G. Ermolieva, T. Forsell, N. Gusti, M. Johnson, N. Kindermann, G. Kolp, P. McCollum, D. L. Pachauri, S. Rao, S. Rogelj, J. Valin, H. Obersteiner, M. Riahi, K., "MESSAGE-GLOBIOM 1.0 Documentation," International Institute for Applied Systems Analysis (IIASA), Tech. Rep., 2016. [Online]. Available: http://data.ene.iiasa.ac.at/message-globiom/

[44] **Gidden, M. J.**, "An Agent-Based Modeling Framework and Application for the Generic Nuclear Fuel Cycle," Thesis, University of Wisconsin, Madison, WI, United States, Mar. 2015

[45] **Gidden, M.**, "An agent-based modeling framework and application for the generic nuclear fuel cycle," Prelim, University of Wisconsin, Madison, Sep. 2013. [Online]. Available: http://dx.doi.org/10.6084/m9.figshare.1132596

SOFTWARE

[46] Carlsen, R. W. **Gidden, M.** Huff, K. Opotowsky, A. C. Rakhimov, O. Scopatz, A. M. Welch, Z. Wilson, P., *Cyclus v1.0.0*, Jun. 2014. [Online]. Available: http://figshare.com/articles/Cyclus_v1_0_0/1041745

[47] Carlsen, R. W. **Gidden, M.** Huff, K. Opotowsky, A. C. Rakhimov, O. Scopatz, A. M. Wilson, P., *Cycamore v1.0.0*, Jun. 2014. [Online]. Available: http://figshare.com/articles/Cycamore_v1_0_0/1041829

[48] **Gidden, M.**, *Cyclopts*, http://mattgidden.com/cyclopts/, Dec. 2014. [Online]. Available: http://mattgidden.com/cyclopts/

[49] Scopatz, A. **Gidden, M.** Welch, Z., "Polyphemus v0.1," Jun. 2014. [Online]. Available: http://dx.doi.org/10.6084/m9.figshare.1066058

[50] Scopatz, A. Bates, C. R. Biondo, E. Huff, K. Kiesling, K. Carlsen, R. Davis, A. **Gidden, M.** Haines, T. Howland, J. Huff, B. Manalo, K. Opotowsky, A. Slaybaugh, R. Relson, E. Romano, P. Shriwise, P. Xia, J. D. Wilson, P. Zachman, J., "Pyne progress report," Nov. 2014. [Online]. Available: http://dx.doi.org/10.6084/m9.figshare.1250143

REFERENCES

Available upon request