

**EAS 573**

**Environmental Footprinting and Input-Output Analysis**

**Winter 2022**

*Time*

Wednesday, 8:30-11:30am

*Location*

Dana 2024

*Instructor*

Ming Xu, Ph.D., Professor, School for Environment and Sustainability & Department of Civil and Environmental Engineering  
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Instructor Office Hours: by appointment

Teaching Assistant: Dr. Bu Zhao ([zhaobu@umich.edu](mailto:zhaobu@umich.edu))

Office Hours: Thursday, 10:00-11:00am

Zoom Link for GSI office hour: <https://umich.zoom.us/j/96538293761> Passcode: IO\_573

**Course Description**

Environmental footprints characterize the pressure on the biophysical environment driven by human consumption throughout increasingly globalized supply chain from a life cycle perspective. Understanding the environmental footprints of human consumption is important for decision-making in many areas of sustainability. This course provides the conceptual and technical background for quantitatively measuring environmental footprints at multiple scales. It introduces theories and concepts of environmental footprints, methods and tools (input-output analysis) to quantify environmental footprints of consumption at the sector, national, and international scales, and various applications such as carbon footprinting and hybrid life cycle assessment. The focus of the course will be on environmental impacts, but economic and social impacts will also be discussed.

This course first introduces the concept of environmental footprints, followed by national accounting systems to develop the basic input-output (IO) analysis framework. It then presents IO techniques to measure various types of environmental footprints of consumption at the sector, national, and international scales. It will also introduce approaches to decompose aggregated environmental impacts into multiple driving forces and quantify contributions of each driving force. Examples demonstrating the applications of these techniques are introduced throughout the course.

Completing this course will provide students a solid conceptual and technical background to develop and apply IO analysis for a variety of environmental footprint problems. It will also help students to develop a system-based, global perspective of modern production and consumption systems. A by-product of this course for students is to learn how to manipulate matrix-based data using MATLAB or Octave (a free software package similar to MATLAB).

**Learning Outcomes:**

- Concept of environmental footprints and policy implications;
- Fundamentals of input-output analysis and its applications to environmental issues;
- Technical skills to develop and apply input-output analysis;

- System-based, global perspective for production and consumption systems;
- A brush-up of matrix algebra;
- Software tools to manage and operate matrix-based data.

### **Prerequisites**

No formal prerequisites. But matrix algebra, basic understanding of economics, and life cycle assessment are beneficial. These topics will be reviewed in class.

### **Software**

Microsoft Office Excel will be used for some of the in-class practices and homework assignments. MATLAB (or Octave) will also be used as the class progresses. Campus computers have MATLAB; Octave is a free software similar to MATLAB. Students are NOT expected to have prior experience with MATLAB or Octave.

- Additional resources for MATLAB
  - ✓ MathWorks. Getting Started with MATLAB.  
<https://www.mathworks.com/help/matlab/getting-started-with-matlab.html>
  - ✓ MathWorks. Getting Started with MATLAB video.  
<http://www.mathworks.com/videos/getting-started-with-matlab-68985.html>
  - ✓ MathWorks. Basic Matrix Operations in MATLAB.  
<http://www.mathworks.com/help/matlab/examples/basic-matrix-operations.html?prodcod=ML>
  - ✓ MATLAB tutorials and learning resources:  
[http://www.mathworks.com/academia/student\\_center/tutorials/launchpad.html](http://www.mathworks.com/academia/student_center/tutorials/launchpad.html)
  - ✓ Ahlersten, K. 2012. An Introduction to MATLAB,  
[https://tcherg.com/assets/images/eBook/1508837763\\_matlab.pdf](https://tcherg.com/assets/images/eBook/1508837763_matlab.pdf)
- Additional resources for Octave
  - ✓ <https://www.gnu.org/software/octave/>
  - ✓ Ng, A. Octave Tutorial. <https://www.coursera.org/course/ml> (sign up for this course and go to Week 2 for Octave/MATLAB Tutorial)

### **Course Format**

This course has both lectures and labs. Lectures are designed to introduce students with concepts and methods. Lecture slides or notes will be uploaded to Canvas. Labs are designed for modeling practices with software and real-world data. Lab instructions will be distributed during the lab sessions. Reports from lab sessions will be submitted for grading as individual homework assignments. There are also low-stake quizzes, mid-term exam, and team-based term project including an in-class presentation, a poster presentation to the public, and a journal-style paper.

### **Homework**

Individual homework assignments are reports from lab sessions which need to be submitted before the next class. Late homework will receive a 1-point deduction for every day overdue.

Any disputes regarding graded material must be written, and turned in with the original copy within one week after it is returned to you.

### **Quizzes**

Low-stake quizzes will be given throughout the course. These are meant to keep you on track helping to move the course material from your short-term memory to your long-term memory.

### **Mid-term Exam**

Each student must complete the exam solely by her or his own efforts. Questions can be asked only to the instructor and the GSI. The exam must be completed within the specified time.

### **Term project**

Students will work in teams on a term project covering either one of the recommended study topics or a topic of their choice that is relevant to the course and approved by the instructor. Final outcome of the project includes an in-class presentation, a poster presentation to the public, and a journal-style paper.

### **Assessment Criteria**

Homework	30%	(6 assignments, 5% each)
Mid-term exam	25%	
Quizzes	10%	(5 quizzes, 2% each)
Project	30%	(presentations 10%, final paper 15%, peer evaluation 5%)
Participation	5%	
Total	100%	

### **Attendance Policy & Academic Honesty**

Attendance at regularly scheduled class meetings is expected, as well as regular participation in class discussions. If you are unable to attend a class, please email me in advance. Students may leave 15 minutes after the start of class if the professor or substitute has not arrived.

Any violation of University of Michigan policy as described in the Rackham Academic and Professional Integrity Policy (<https://rackham.umich.edu/academic-policies/section8/>) will not be tolerated and may result in a failing grade. This course will be conducted in strict conformity with the Policy. Claimed ignorance of the Policy and related information appearing on the sites will be viewed as irrelevant should a violation take place. It is the responsibility of the student to be familiar with the terms of the Policy.

### **Student Well-Being**

Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, mental health, alcohol or other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. If the source of your stressors is academic, please contact me so that we can find solutions together. For personal concerns, U-M offers many resources, some of

which are listed at [Resources for Student Well-being](#) on the Well-being for U-M Students website. You can also search for additional resources on that website.

## Readings

There is no text for this course. Readings and handouts will be posted on Canvas, unless a URL is provided in the syllabus. Students are required to be familiar with the required reading materials prior the class. In class, required reading materials will be discussed and students are assumed to have basic knowledge about the materials.

Good general references for input-output analysis and its application to environmental systems analysis are:

- ✓ R. E. Miller, P. D. Blair. 2009. Input-Output Analysis: Foundations and Extensions, 2nd Edition. Cambridge University Press, New York.
- ✓ S. Suh (ed.). 2009. Handbook of Input-Output Economics in Industrial Ecology. Springer. *(online access available through University of Michigan Library)*
- ✓ J. Murray, R. Wood (eds.). 2010. The Sustainability Practitioner's Guide to Input-Output Analysis. Common Ground, Champaign, Illinois.
- ✓ J. Murray, M. Lenzen (eds.). 2013. The Sustainability Practitioner's Guide to Multi-Regional Input-Output Analysis. Common Ground, Champaign, Illinois.
- ✓ A. Alsamawi, et al. 2017. The Social Footprints of Global Trade. Springer. *(online access available through University of Michigan Library)*

Online databases and tools:

- ✓ World Input-Output Database (WIOD): <http://www.wiod.org>
- ✓ Eora MRIO Database: <http://www.worldmrio.com>
- ✓ EXIOBASE: <http://www.exiobase.eu>
- ✓ OECD Input-Output Tables: <http://www.oecd.org/trade/input-outputtables.htm>
- ✓ Asian Development Bank IO Tables: <https://www.adb.org/publications/economic-indicators-eastern-asia-input-output-tables>
- ✓ A list of IO data sources compiled by International Input-Output Associate: <https://www.iioa.org/news/io-data.html>
- ✓ US Bureau of Economic Analysis Input-Output Accounts Data: [http://www.bea.gov/industry/io\\_annual.htm](http://www.bea.gov/industry/io_annual.htm)
- ✓ US Environmentally Extended Input-Output (USEEIO) database: <https://www.epa.gov/land-research/us-environmentally-extended-input-output-useeio-technical-content>
- ✓ Eurostat ESA Supply, use and input-output tables: <http://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/overview>
- ✓ Chinese Environmentally Extended Input-Output (CEEIO) Database: <http://www.ceeio.com>
- ✓ EIO-LCA: <http://www.eiolca.net>

Useful database for academic journals:

- ✓ <http://scholar.google.com>
- ✓ Web of Science @ U-M Lib: <http://www.lib.umich.edu/database/link/10165>
- ✓ Scopus @ U-M Lib: <http://www.lib.umich.edu/database/link/10049>

IMPORTANT: You can use Wikipedia for references, but you can NEVER trust it nor cite it in your papers.

**Course Outline (*subject to change*)**

Week	Date	Topics
1	1/5	<p>Introduction</p> <ul style="list-style-type: none"> <li>• Wiedmann, T. and M. Lenzen. 2018. Environmental and social footprints of international trade. <i>Nature Geoscience</i>, 11, 314-321.</li> <li>• Murray, J. and M. Lenzen. 2010. Introduction to input-output analysis. In J. Murray and R. Wood (Eds). <i>The Sustainability Practitioner’s Guide to Input-Output Analysis</i>. Common Ground Publishing.</li> </ul> <p>Input-Output (IO) Game</p>
2	1/12	<p>Economic IO Model</p> <ul style="list-style-type: none"> <li>• Lequiller, F. and D. Blades. 2014. <i>Understanding National Accounts</i>, Second Edition, <b>Chapter 10</b>. OECD Publishing. <a href="http://www.oecd-ilibrary.org/economics/understanding-national-accounts_9789264214637-en">http://www.oecd-ilibrary.org/economics/understanding-national-accounts_9789264214637-en</a> (using U-M network), or <a href="http://www.lib.umich.edu/database/link/11097">http://www.lib.umich.edu/database/link/11097</a> (log into the OECD iLibrary then search for “Understanding National Accounts Second Edition”)</li> <li>• Miller, R.E. and P.D. Blair. 2009. <i>Input-Output Analysis: Foundations and Extensions</i>, Second Edition, <b>Chapter 2.3</b>. Cambridge University Press, New York</li> </ul> <p>Matrix Algebra</p> <ul style="list-style-type: none"> <li>• Matthews, K. 1991. <i>Elementary Linear Algebra</i>, <b>Chapters 1 and 2</b>. <a href="http://www.numbertheory.org/book/">http://www.numbertheory.org/book/</a></li> <li>• Khan Academy. Matrices. <a href="https://www.khanacademy.org/math/precalculus/precalc-matrices">https://www.khanacademy.org/math/precalculus/precalc-matrices</a></li> </ul> <p>Quiz #1: IO Concepts</p>
3	1/19	<p>Modeling Supply Chain</p> <ul style="list-style-type: none"> <li>• Miller, R.E. and P.D. Blair. 2009. <i>Input-Output Analysis: Foundations and Extensions</i>, Second Edition, <b>Chapter 2.4</b>. Cambridge University Press, New York.</li> </ul> <p>Lab #1: IO modeling in Excel</p>
4	1/26	<p>MATLAB</p> <ul style="list-style-type: none"> <li>• Handout</li> </ul>

Week	Date	Topics
		<ul style="list-style-type: none"> <li>• Additional resources for MATLAB <ul style="list-style-type: none"> <li>✓ MathWorks. Getting Started with MATLAB. <a href="https://www.mathworks.com/help/matlab/getting-started-with-matlab.html">https://www.mathworks.com/help/matlab/getting-started-with-matlab.html</a></li> <li>✓ MathWorks. Getting Started with MATLAB video. <a href="http://www.mathworks.com/videos/getting-started-with-matlab-68985.html">http://www.mathworks.com/videos/getting-started-with-matlab-68985.html</a></li> <li>✓ MathWorks. Basic Matrix Operations in MATLAB. <a href="http://www.mathworks.com/help/matlab/examples/basic-matrix-operations.html?prodcode=ML">http://www.mathworks.com/help/matlab/examples/basic-matrix-operations.html?prodcode=ML</a></li> <li>✓ MATLAB tutorials and learning resources: <a href="http://www.mathworks.com/academia/student_center/tutorials/launchpad.html">http://www.mathworks.com/academia/student_center/tutorials/launchpad.html</a></li> <li>✓ Ahlersten, K. 2012. An Introduction to MATLAB, <a href="https://tcherg.com/assets/images/eBook/1508837763_matlab.pdf">https://tcherg.com/assets/images/eBook/1508837763_matlab.pdf</a></li> </ul> </li> <li>• Additional resources for Octave <ul style="list-style-type: none"> <li>✓ <a href="https://www.gnu.org/software/octave/">https://www.gnu.org/software/octave/</a></li> <li>✓ Ng, A. Octave Tutorial. <a href="https://www.coursera.org/course/ml">https://www.coursera.org/course/ml</a> (sign up for this course and go to Week 2 for Octave/MATLAB Tutorial)</li> </ul> </li> </ul> <p>Quiz #2: Matrix Algebra</p>
		Lab #2: IO modeling in MATLAB
5	2/2	Environmental Satellite Account <ul style="list-style-type: none"> <li>• Lave, L.B., et al. 1995. Using input-output analysis to estimate economy-wide discharges. <i>Environmental Science &amp; Technology</i>, 29 (9), 420A-426A.</li> <li>• Suh, S. 2006. Are services better for climate change? <i>Environmental Science &amp; Technology</i>, 40 (21), 6555-6560.</li> </ul> <p>Quiz #3: MATLAB</p>
		Lab #3: Update Suh (2006)
6	2/9	Multi-regional IO (MRIO) Model; IO Databases <ul style="list-style-type: none"> <li>• Kanemoto, K. and J. Murray. 2013. What is MRIO: benefits &amp; limitations. In J. Murray and M. Lenzen (Eds). <i>The Sustainability Practitioner's Guide to Multi-Regional Input-Output Analysis</i>. Common Ground Publishing.</li> </ul> Wiedmann, T., et al. 2011. Quo Vadis MRIO? Methodological, data and institutional requirements for multi-region input-output analysis. <i>Ecological Economics</i> , 70 (11), 1937-1945.
		Lab #4: MRIO modeling using Eora <ul style="list-style-type: none"> <li>• Lenzen, M., et al. 2012. Mapping the structure of the world economy. <i>Environmental Science &amp; Technology</i>, 46, 8374-8381</li> </ul>

Week	Date	Topics
7	2/16	<p>Team Project</p> <p>Hybrid Life Cycle Assessment, WIOD</p> <ul style="list-style-type: none"> <li>• Crawford, R. H., et al. 2018. Hybrid life cycle inventory methods – A review. <i>Journal of Cleaner Production</i>, 172, 1273-1288.</li> <li>• Salemdeeb, R., et al. 2018. An environmental evaluation of food waste downstream management options: a hybrid LCA approach. <i>International Journal of Recycling of Organic Waste in Agriculture</i>, 7, 217-229.</li> </ul>
8	2/23	Mid-term exam
	3/2	Break (no class)
9	3/9	<p>Mid-term exam review</p> <p>Team Project Proposal Presentations</p>
10	3/16	<p>Structural Decomposition Analysis (SDA)</p> <ul style="list-style-type: none"> <li>• Dietzenbacker, E. and B. Los. 1998. Structural decomposition techniques: sense and sensitivity. <i>Economic Systems Research</i>, 10 (4), 307-323.</li> <li>• Guan, D., et al. 2009. Journey to world top emitter: an analysis of the driving forces of China's recent CO2 emission surge. <i>Geophysical Research Letters</i>, 36, L04709.</li> </ul>
		<p>Quiz #4: SDA</p> <p>Lab #5: SDA using WIOD</p> <ul style="list-style-type: none"> <li>• Timmer, M. P., et al. 2015. An illustrated user guide to the World Input-Output Database: the case of global automotive production. <i>Review of International Economics</i>, 23 (3), 575-605.</li> </ul>
11	3/23	<p>Advanced Topics</p> <ul style="list-style-type: none"> <li>• Malik, A., et al. 2018. Advancements in input-output models and indicators for consumption-based accounting. <i>Journal of Industrial Ecology</i>, 23 (2), 300-312.</li> <li>• Sun, Z., et al. 2019. Going global to local: connecting top-down accounting and local impacts, a methodological review of spatially explicit input-output approaches. <i>Environmental Science &amp; Technology</i>, 53, 1048-1062.</li> </ul>
		Team Project Interim Progress Presentations
12	3/30	<p>Ghosh Model; Linkage Analysis</p> <ul style="list-style-type: none"> <li>• Lenzen, M. 2003. Environmentally important paths, linkages and key sectors in the Australian economy. <i>Structural Change and Economic Dynamics</i>, 14, 1-34.</li> <li>• He, H., et al. 2019. Assessing net energy consumption of Australian economy from 2004-05 to 2014-15: environmentally-extended input-output analysis, structural decomposition analysis, and linkage analysis. <i>Applied Energy</i>, 240, 766-777.</li> </ul>
		<p>Quiz #5: Ghosh Model, Linkage Analysis</p> <p>Lab #6: Income-based accounting</p> <ul style="list-style-type: none"> <li>• Liang, S., et al. 2017. Income-based greenhouse gas emissions of nations. <i>Environmental Science &amp; Technology</i>, 51, 346-355.</li> </ul>

<b>Week</b>	<b>Date</b>	<b>Topics</b>
13	4/6	Structural Path Analysis, RAS to update IO tables
14	4/13	Team Project Presentations
	4/25	Due: Team Project Report (8am)



## Term Project Grading Rubrics

The term project contributes to 30% of the final grade, including these three components:

### 1. Presentations (10%)

Each group presents their project to the class three times, including a project topic proposal presentation, interim progress presentation, and final presentation. Each group will also present a poster to the public. All members of the group are expected to present. The presentation should include the follows when applicable:

- Title and name
- Research question
- Motivation, importance, and how it relates to this course and specific topics we have discussed in class
- Research methods and data
- Results and implications
- Conclusions

Grading criteria for the presentations:

	Exemplary	Competent	Developing
Organization (20%)	Presentation is clear, logical, and organized. Audience can follow line of reasoning.	Presentation is generally clear and organized. Some points may be confusing.	Organization is haphazard. Audience can follow only with effort. Logic is not clear.
Content (50%)	Presentation provides accurate and complete explanations of the research. Audience knows clearly what this case is intended to teach and how it will look like.	For the most part, explanations are accurate and complete. There are some components of the research are not clearly explained. Audience has a good idea of what this research is about.	Explanations are inaccurate and incomplete. Audience is not clear what the research is intended to do.
Presentation (20%)	Speakers give clear, engaging presentations of the poster. Speakers maintains good eye contact with the audience and is appropriately animated (gestures, moving around, etc.). Poster is clear and informative.	Speakers give generally clear presentations with eye contact with the audience. Poster is generally clear and informative.	Speakers do not seem to be familiar with the poster. Poster is unclear and hard to follow.

Question answering (10%)	Give direct, clear, accurate answers to questions.	Answers to questions are generally direct, clear and accurate.	Cannot provide direct, clear, and accurate answers to questions.
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## 2. Project paper (15%)

A template for your project paper (no more than 10 pages) is attached below. The paper should provide complete, accurate description of the research motivation, research question, methods, data, results, and discussions. Include only KEY figures and tables in the paper; no-essential text, figures, and tables that are useful for readers to understand can be included in the appendix which does not count for the page limit.

Grading criteria for the project paper:

	Exemplary	Competent	Developing
Research question (10%)	Research question is clearly defined with appropriate scope.	Research question is clear, but the scope might be too narrow or too broad.	Research question is not clear or ill-defined.
Research design and execution (40%)	Methods and data are appropriate for the research question. The execution is correctly done.	Methods and data are relevant to the research question. The execution is generally correct.	Methods and data are not appropriate for the research question. There are mistakes in the execution of the research.
Depth of discussion (20%)	In-depth discussion and elaboration on the research results. Clear elaboration on policy implications.	In-depth discussion and elaboration on some results.	Cursory discussion on the research results. No mention of policy implications.
Cohesiveness (10%)	Paper flows from one issue to the next smoothly. Writing demonstrates a good understanding of the topic, methods, and state-of-the-art.	For the most part paper flows smoothly. Writing demonstrates a general understanding of the topic, methods, and state-of-the-art.	Paper is written without clear logic, does not flow, and appears to be created from disparate issues. Writing demonstrates lack of understanding of the topic, methods, and state-of-the-art.
Spelling and grammar (10%)	No spelling and/or grammar mistakes.	Minimal spelling and/or grammar mistakes.	Noticeable spelling and/or grammar mistakes.

Citations (10%)	References are cited throughout the paper to back authors' claims or provide sources of information, methods, or data. References are from reputable sources, largely from peer-reviewed journals. Citation style is used correctly and consistently.	For the most part references are cited to back claims or provide sources of information, methods, and data. References are generally from reputable sources. Citation style is used almost correctly and consistently.	Inadequate references are cited to back claims and provide sources. References are mostly from non-reputable sources such as websites, Wikipedia. Citation style is used incorrectly and inconsistently.
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### 3. Peer evaluation (5%)

Each student will be asked to evaluate the performance of other members of the group. An evaluation form will be distributed to students after the final poster submission. All peer evaluations will be kept confidential.

PLACE YOUR PAPER TITLE HERE (NO MORE THAN 10 PAGES TOTAL EXCL. APPENDIX)

**Author1 Name (affiliation, email address), Author2 Name (affiliation, email address)**

**ABSTRACT.** START THE FIRST LINE OF THE ABSTRACT ON THE SAME LINE AS THE HEADING “ABSTRACT” IN BOLD, FOLLOWED BY A PERIOD. YOU MAY USE EITHER ONE SPACE AFTER A PERIOD, OR TWO. ALL TEXT THROUGHOUT PAPER IS ARIAL SIZE 12. PLEASE LEFT-JUSTIFY (ALIGN TEXT LEFT) ALL PARAGRAPHS. ABSTRACT SHOULD BE ABOUT 300 WORDS AND PROVIDE A SYNOPSIS OF THE PAPER, INCLUDING MOST IMPORTANT RESULTS.

**Introduction.** Leave a blank line between paragraphs. Do not indent.

In the introduction, describe the problem statement, challenge, knowledge gap, or the motivation for the study.

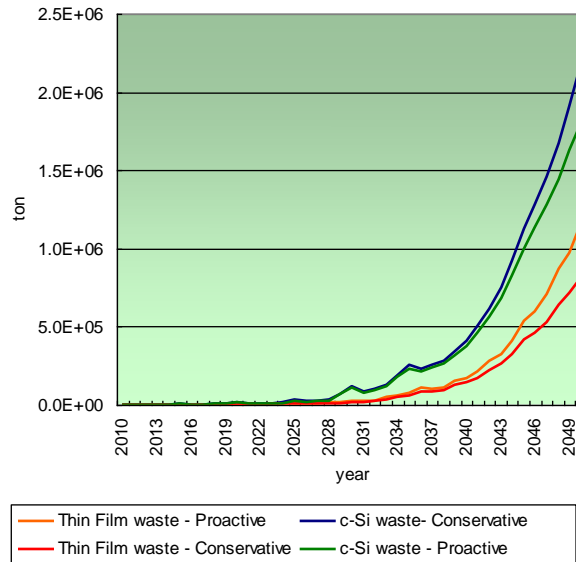
References are cited within a sentence such as Last-Name (year) for single-author publications, Last-Name-1 and Last-Name-2 (year) for two-author publications, and Last-Name et al. (year) for publications with more than two authors. References can also be cited without being part of a sentence (Last-Name, year).

*Subheader.* Where subheaders are appropriate, use italics. Use existing literature to both establish the importance and novelty of the work. Minimizing number of subheaders you use.

**Research Questions (or Hypothesis).** Where appropriate, include a section for the hypothesis or research questions. If the paper is neither hypothesis- nor research question-driven, use headers of your own invention (such as ‘Goals’.)

**Method.** Describe the methods employed in the research, including materials (if appropriate), boundaries, data sources or scope.

**Results and Discussion.** Where ‘results’ are reported, include quantitative and/or qualitative data. Graphs and figures are preferable to data tables, and tables are preferable to reporting data as text in paragraphs.



**Figure 1: Example Figure.** Center figures on the page, and center figure captions below the figure. All figures must have a caption. Use Arial Narrow 11pt. Begin the caption with ‘Figure #: Name of Figure.’ in bold and then write a brief description or interpretation.

**Table 1. Please Put The Title Of Table Above Each Table and Use Bold Text, Arial Narrow 11**

	Single pilot	Full pilot plant	Automated plant
Capacity	1876 module (~ 17ton)	185 ton/year	20,000 ton/year
Processing type	Manual separation	Manual Separation	Automated Separation
Throughput	Low	Low	High
Recovery rate	85%	85%	96%
Type of PV	mono-Si module	Crystalline Modules	Mixed modules

**REFERENCES (DO NOT INCLUDE MORE THAN TEN REFERENCES)**

Last Name of 1<sup>st</sup> Author and Initials of 1<sup>st</sup> Author, Last Name and Initials of Other Authors. Year of Publication. Title of Journal Paper. *Name of Journal*, Issue: pp. Digital Object Identifier or URL (where available or appropriate).

Last Name of 1<sup>st</sup> Author and Initials of 1<sup>st</sup> Author, Last Name and Initials of Other Authors. Year of Publication. *Title of Book or Report, Number of Report (i.e. EPA 2-3344)*, Name of Institution. Digital Object Identifier or URL (where available or appropriate).

Last Name of 1<sup>st</sup> Author and Initials of 1<sup>st</sup> Author, Last Name and Initials of Other Authors. Year of Publication. Title of book chapter or conference proceeding. In *Title of Book or Name, Date and Location of Conference*. Digital Object Identifier or URL (where available or appropriate).

**APPENDIX (OPTIONAL, NOT WITHIN THE 10 PAGE LIMIT)**