

PRELIMINARY SYLLABUS

CFAN 3520 “Germany: Leading the Renewables Revolution”—intensive study abroad seminar to experience Germany’s globally inspiring energy transition

Winter 2018 (note that the course is considered an embedded Fall Semester 2017 course)

J-Term 2018. January 2 -14, 2018; and Nov. 4, Nov. 18, and Dec. 2. 3-credit course.

Instructors:

Sabine Engel, PhD, program director for international partnerships, Institute on the Environment, U of M; PI on energy policy grants with German government (2011-2013; 2014-2015; 2016; 2017); PI on Climate-Smart Municipalities project co-funded by German government (2016-2018).

Beth Mercer-Taylor, J.D., sustainability education coordinator, Institute on the Environment, U of M. She administers the Sustainability Studies Minor. Beth has helped to implement the GreenStep Cities program in Minnesota and many campus sustainability programs.

Special topic expert:

Troy Goodnough directs the office of sustainability at the University of Minnesota, Morris. He has served in this role for the past decade. Previous to his university service, Troy spent a decade in semiconductor start-up companies leading crystal growth operations for laser development. Troy was the first sustainability coordinator hired in the University of Minnesota-system in 2006 and has also served in the Center for Small Towns.

Background:

A special relationship between Minnesota and NRW allows multi-stakeholder collaboration on renewable energy

For the past six years, the University of Minnesota has organized a high-level policy exchange with Germany’s federal government on renewable energy policy and Germany’s ambitious energy transition (80% renewables by 2050). To date, 32 bipartisan members of the MN state legislature and MN commissioners as well as representatives for MN utilities, NGOs and U of M leaders have traveled to Germany as part of the program. Beginning right after the 2011 nuclear accident in Fukushima, Japan, the policy exchange has allowed MN leaders a firsthand view of the massive restructuring effort of a major world economy. Minnesota’s solar energy legislation of 2013 is among the lasting and most visible direct outcomes. In December 2013, Minnesota signed an agreement with the NRW Ministry for Climate Protection, Environment, Agriculture, Nature Conservation and Consumer Protection (MKULNV) to cooperate on renewable energy and energy efficiency. In October 2015 and at the suggestion of MKULNV, Minnesota Governor Dayton signed the Under 2 MOU, recommitting the state to limiting the impact of climate change and collaborating on actions to promote adaptation and resilience. MN and NRW states have built organizational structures and instruments to support and accelerate the adoption of economically beneficial energy strategies. Both states embrace a culture of collaboration that allows multiple stakeholders to work together for maximum individual benefit. Both states have large geographic footprints and extensive rural areas.

Expanding the dialogue to U of M students as the generation of future leaders

With this study abroad experience, we would like to expose students to the ongoing bi-national dialogue, to highlight the systems approach underlying Germany’s energy transition, and to allow students to experience and understand the energy transition as a project that ties together social, technical, and political issues and requires collaborative leadership across those divisions.

Course description: Germany and the Scandinavian countries have a long track record as sustainability leaders—from creating comprehensive recycling programs to embracing energy efficiency to replacing fossil with renewable fuels to building large public transportation systems. There is majority support in the public for “green” technologies and for finding effective ways to reducing the climate impact of a large industrial society. In summer 2011 and reacting to massive political pressure from the citizenry to immediately exit nuclear power, Germany’s conservative government under Chancellor Angela Merkel announced the energy transition. The country would exit nuclear power by 2022. It would dramatically increase the percentage of renewables in the electricity mix (80% renewables by 2050). It would establish milestones to successively reduce greenhouse gas emissions by 80% compared to 1990 levels. Germany, in effect, is a live laboratory for a broad technological and social transformation that requires new kinds of collaboration between established actors.

This study abroad course introduces students to the political, social, and technological settings within which the transformation to a market-based green economy takes place. Students will meet with the full range of stakeholders and agents—in politics, government, the private sector, research and education, and civil society. They will also visit sites that model Germany’s integrated approach to the energy transition. The primary site is the award-winning small city of Saerbeck in rural North Rhine-Westphalia (NRW). Saerbeck’s city leadership embraces broad-scale collaboration, partners with regional and national applied research institutions on new advances in renewable energy storage, combined heat and power, solar and wind power, and the electrification of transportation. In October 2015, Saerbeck began a technical partnership with the City of Morris, Minnesota, and UMM to cooperate on measures that reduce the communities’ carbon footprints and generate economic benefits. This study abroad course takes advantage of an international agreement between the state of Minnesota and the state of North Rhine-Westphalia to work together on best practices in renewable energy and energy efficiency. Students will have a unique opportunity to experience Germany’s accelerating energy transition. To foster bi-national learning, they will also generate reports to the German partners on the status of Minnesota’s energy transition.

Learning Outcomes:

By the end of the course students should substantively understand:

- The basic concept of Germany’s energy transition as a comprehensive societal transformation that is only partly about technology
- the various technologies that need to be combined across sectors to achieve a sustainable, secure, and affordable energy system
- the need to invest in multiple and parallel new technologies
- the differences between the energy system in the USA and Germany
- the levers for action in a democratic system and the crucial role of citizens
- the history and status of Minnesota’s efforts to advance renewable energy

Additionally, students will learn habits of mind that are crucial to grappling with complex societal challenges. They will:

- develop an understanding of competing social demands and interests and ask questions that emphasize social justice issues
- see and evaluate projects that connect policy and practice
- develop a better understanding of why and how cultural differences enrich solutions to complex problems

- practice effective communication skills in writing and speaking assignments
- locate and critically evaluate sources of information
- reflect on their own role in solving the 21st-century climate challenge

Environmental Theme

As the 21st century begins, there is probably no set of issues on which academic research, educational instruction, the demands of public policy, and the requirements of informed citizenship are more powerfully joined than those relating to the environment. Over the last half century, even with a doubling of the human population, human health and per capita income have improved dramatically in many parts of the world as supplies of food and energy increased in combination with advances in technology. This success has required a vast increase in the intensity of human use of the environment with the inadvertent, environmental impacts such as global climate change, air and water quality degradation, loss of biological diversity, and invasions by exotic species. During the coming 50 years, the human population is projected to increase by 40%, leading to further stresses on the environment. Societal policies and practices must change to minimize environmental impacts. Now more than ever all citizens need to be engaged with the science and policy surrounding the environment to minimize unintended environmental impacts from the local to global scale.

Environmental issues are complex. Finding solutions to these environmental issues will have students vigorously debating the myriad of solutions; weighing the costs with the benefits and tradeoffs among alternative policies and practices; exploring the roles of science and technology; learning to become involved, informed, and constructive citizens after graduation. Issues such as sustainability and the ethics of intergenerational equity must be weighed against meeting current needs and wants. The pursuit of solutions to environmental issues is a highly synthetic and interdisciplinary endeavor. Therefore, courses that fulfill this Theme need to connect students, in explicit ways, to solving problems. A broad array of disciplines, from physical and biological sciences, to the social sciences and humanities need to be integrated into the proposed solutions, which must be based on science, but which will be implemented and sustained only if they are consistent with the ethics and values of society.

The environment theme asks that courses must meet these criteria by:

Raising environmental issues of major significance:

CFAN 3520 addresses the environmental benefits of societal-level shifts away from fossil fuels in energy production, distribution and usage, both in Minnesota and in Germany. The course presents the opportunities and challenges of a clean energy transition, and compares the context of Minnesota and Germany, including scientific, technological, economic, public policy and cultural perspectives. Carbon and pollution reduction are key benefits of clean energy, but shifts away from conventional energy causes economic dislocation for some workers and industries.

Giving explicit attention to interrelationships between the natural environment and human society:

CFAN 3520 presents to students the enormous impact of human energy systems on the natural environment, and on human society as well, in both Minnesota and in Germany. Students will be expected to understand and present the policy and cultural frameworks through which Minnesotans care for and use the natural environment. Students will be considered to be members of a Minnesota energy delegation, by the German professionals that they interact with. German and European understanding of land use, community and natural resources will be compared to that of Minnesota and the U.S.

Underlying scientific principles behind environmental issues will be examined:

CFAN 3520 students will gain an understanding of the scientific and engineering concepts of carbon reduction and energy transition at scale, including the necessity of deploying multiple renewable energy technologies (wind, solar, small hydro, geothermal and others) to achieve a stable clean energy system, the different needs for baseload and for peaking power, the costs and opportunities of energy storage, the benefits of smart grids, the particular challenges of biofuels, the water and energy nexus and much more. Minnesota and German technical experts in addressing climate change, crafting environmental policy and operating complex energy systems will present to students and address their questions.

Students explore the limitations of technologies and the constraints of science on the public policy issues being considered.

One of the purposes of visiting Germany is to explore transition to a clean energy economy in a highly developed country with a strong environmental ethic and commitment to clean energy across multiple party lines, that nevertheless faces a variety of challenges in scaling up solar, wind, biofuel and other clean energy technologies. CFAN 3520 students will be asked in their daily writing to reflect on the interaction of technological, economic, and cultural aspects of the energy and environmental issues they encounter.

Students learn how to identify and evaluate credible information concerning the environment.

CFAN 3520 students will collect information about the Minnesota and German energy transition from assigned readings, from Minnesota and German experts and from their own research. They will be asked to document, assess, discuss, receive feedback on and make presentations about selected energy topics, both individually and in a group format.

Students demonstrate an understanding that solutions to environmental problems will only be sustained if they are consistent with the ethics and values of society.

In preparing to serve as members of a Minnesota energy delegation to Germany, CFAN 5020 students will be exposed to and contemplate German care for natural resources, relationships to land, political systems, culture, ethics and social values, and how these influence energy and environmental policy. Students will in turn come to understand more about their own culture, ethics, and belief system, and how these influence their view of energy systems and the environment.

Global Perspectives Liberal Education Theme:

Undergraduates must develop the competence to function effectively and ethically in a complex, rapidly changing world that is increasingly interdependent yet fraught with conflicts and disparities. The Global Perspectives Theme assures that graduates from the University have at least one significant exposure to the world beyond U.S. borders, and the opportunity to consider the implications of this knowledge for the international community and their own lives.

In the case of this course, students will experience concentrated study of a particular country, culture and region - Germany-through in-depth focus on the matter of the German energy transition, as it is situated in a European and a comparative international context, and as it compares to the energy transition in Minnesota and in the United States. Through the lens of the energy system in Germany, students will cultivate a broader and more thoughtful perspective on the technological, policy and cultural aspects of providing power for human needs. Given that energy systems in a highly developed European country like Germany differ from the U.S., in that they involve multilateral financial, business and trading relationships, as well as complex international policy frameworks, students will learn first-hand how geography, politics, history, economics intersect in shaping as fundamental an aspect of

modern society as energy. In addition to a deep exposure to energy systems in an interdisciplinary context,, students will be exposed to German culture through class excursions and discussions on current issues affecting the cities we will visit, including immigration, economic development, housing, transportation, city planning, architecture, contemporary art, food traditions and fashion.

The Global Perspectives Themes entails that the following criteria are met:

The course, and most or all of the material covered in the course, focuses on the world beyond the United States.

CFAN 3520 focuses on energy transition from a distinctly German perspective and experience - in which clean energy technologies are already applied at scale and are well understood by the populace - and also considers how Germany's learning about clean energy is already being applied in other countries, regions and even globally.

The course either (1) focuses in depth upon a particular country, culture, or region or some aspect thereof; (2) addresses a particular issue, problem, or phenomenon with respect to two or more countries, cultures, or regions; or (3) examines global affairs through a comparative framework.

CFAN 3520 emphasizes the historical, cultural and economic reasons why Germany, in particular, became a global leader in clean energy adoption and innovation. The course also addresses, at a global scale, the issue of the renewable energy transition now underway throughout the world, particularly in wealthier developed countries in which decoupling energy/ carbon usage and economic growth offers a solution to climate change and a path towards technology and policy innovation.

Students discuss and reflect on the implications of issues raised by the course material for the international community, the United States, and/or for their own lives.

The intent of CFAN 3520 is for students to become members of an on-going international exchange between Minnesota and Germany, in which Minnesota professionals and students who have traveled to Germany are all encouraged to reflect on what they learned, how the experience changed their views, to build community with one another around their experiences, and most importantly, to find ways to work together to bring to Minnesota the best new energy-related ideas, projects and opportunities.

Texts: The reading material for this class includes a number of articles and documents available on the course website. In addition, students must purchase a packet containing excerpts from books.

The course begins with two one-day Saturday workshops that use video-conferencing in order to minimize course travel for participants from the various campuses. Instructors or partner faculty/staff members associated with the course (e.g. campus sustainability coordinators) will be present at each campus location and participate as expert speakers.

We encourage the Duluth and Morris students to consider attending the Dec. 2 workshop in person at the Twin Cities location.

Grades:

Students may earn a possible total of 100 points.

Class Participation (Minnesota workshops; Germany seminar and site visits) - 20 points: Students will earn points for constructive participation.

Daily reflection journal while abroad – 10 points: Students will receive one point for a daily page of writing, sketching and/or photography that focuses on their cultural experience and intercultural observation

Mini-research paper to be included as background briefing material on the course website – 20 points: assignment announced at first workshop in Nov., due at second workshop.

Final paper or project – 40 points: completed after Germany experience; due date: Feb. 19, 2018

On-campus public research presentation on final project – 10 points: students will present their research to faculty, staff, and other students at a special event that involves the U's Energy Transition Lab, IonE, CERTS, and the sustainability coordinators

Grades and Incompletes

In accordance with the University of Minnesota Uniform Grading Policy, we will grade your performance in this course based on the following scale:

- A: Achievement that is outstanding relative to the level necessary to meet course requirements.
- B: Achievement that is significantly above the level necessary to meet course requirements.
- C: Achievement that meets the course requirements in every respect.
- D: Achievement that is worthy of credit, even though it fails to meet fully the course requirements.
- F: Represents failure and signifies that the work was either: 1) completed, but at a level not worthy of credit, or 2) not completed and there was no agreement between the student and instructors that the student would be awarded an "incomplete".

Incompletes will only be given under extraordinary circumstances late in the semester that prevent normal completion of the course requirements. If such extraordinary circumstances arise, contact the instructors as soon as possible to review the situation.

Scholastic Dishonesty

Scholastic dishonesty is any act by a student that misrepresents the student's own academic work or that compromises the academic work of another. Examples include plagiarizing, cheating on assignments or examinations, and engaging in unauthorized collaboration on academic work. Students who engage in dishonest conduct will be referred to academic affairs.

Students With Disabilities

Any student with a documented disability (physical, learning, systemic, vision, hearing etc.) who need to arrange special accommodations should contact the instructors and the Office of Disability Services (160 McNamara Alumni Center, 612-626-1333 TTY) as soon as possible.

Sexual Harassment

Sexual harassment by or toward a member of the University community is prohibited by Board of Regents policy. Complaints about sexual harassment should be reported to the University's Office of Equal Opportunity and Affirmative Action, 419 Morrill Hall.

Classroom Conduct

All students at the University have the right to a civil, productive, and stimulating learning environment. In turn, instructors have a responsibility to nurture and maintain such an environment. Lively, even heated, discussion is not disruptive behavior. Both instructors and students have a fundamental

obligation to respect the rights of each other and an equally fundamental obligation to respect the instructional setting as a place for civil, courteous behavior. Students who disrupt the educational process because of discourteous, threatening, harassing, or other aggressive behavior will be removed from class.

Course schedule and syllabus

Workshop #1, Saturday, Nov. 4, 9:00-4:30, room LES-R370 (Twin Cities campus) Minnesota's Energy Transition—history, politics, economics, regulatory framework

A day with seminar sessions and group activities.

- 9-10:15 am - Introductions of students, instructors, overview of program, substantive and intercultural development
- 10:15-10:25 break
- 10:25-12:00 am – Minnesota's Energy Transition
[Minnesota's track record as a national leader for renewable energy legislation; Minnesota's Renewable Energy Standard; MN Next Generation Energy Act; MN Solar Energy legislation]
- 12-12:30 group activity
- 12:30 -1 pm - lunch at each campus location
- 1 -2:15 pm - Regulatory perspective
Guest speaker: Public Utilities Commissioner Matt Schuerger
- 2:30- 3:30 pm - the economics of energy with a focus on Minnesota
Guest speaker: Dr. Arne Kildegaard, UMM
- 3:30 - 4:30 pm – course logistics, debrief, reflect, discuss readings and assignments, questions?

Workshop #2, Saturday, Nov. 18, 9:00-4:30 Germany's Energy Transition—History, Context, Players

A day with interactive seminar sessions

Required reading:

"Germany's Energiewende in 416 words": <https://www.cleanenergywire.org/dossiers/germanys-energiewende-easy-guide#Description>

and

<https://www.cleanenergywire.org/factsheets/main-stories-germanys-energiewende>

- 9am- 11:00 am Germany's political system, in comparison to the US and in terms of recent changes at federal and provincial levels, status of various parties with regard to energy transition, matter of forming governing coalition with 3-4 parties (speed of adoption of renewable), interactive exercise on forming a government (caucus meetings to organize parties, then establishment of guideline document), Q & A
- 11:00-11:15 Break
- 11:15-12:30 pm - Germany's energy transition, 1974 to the present
Guest speaker: Dr. Gabe Chan, Humphrey School of Public Affairs (tbc)
- 12:30 - 1pm -lunch

- 1:00- 1:15 Intercultural Development Inventory (IDI) and presentation by CFAN/ Learning Abroad staff, safety talk, orientation
Guest speaker: Maggie Wallenta, Study Abroad Program
- break
- 2:30 - 3:30 - Shane Stennes, director of sustainability, U of M Facilities Management—applied solutions, UMN as a city, what are we doing - overall climate action planning, recent community solar and solar on campus commitments
- 3:30-4:30 - What do you know about energy in Minnesota, what do you want to know about energy in Germany, policy to projects to cultural change? Debrief, questions on readings, sign up for assignments for next workshop (will include powerpoint presentation, photograph of you and your home)

Workshop #3, Saturday, Dec. 2, 9:00-4:30

Culture, Logistics, Travel

- Review of what we have learned so far, questions about readings, items to add to afternoon (around logistics, intercultural learning)
- 9:30 - 11:30 am Student presentations about political representation and a project they are connected to, either from experience or near where they are from or living now.
- 11:30-12:30 break and lunch
- 12:30-1:30 bipartisan energy perspectives
Guest speakers: MN State Senator David Senjem (tbc) and MN State Representative Frank Hornstein (tbc)
- 1:30-2:30 the systems approach to the energy transition—guest speaker from the business sector
- 2:30-2:45 break
- 2:45- 4:15 pm - Logistics and preparing to go to Germany! Packing, transportation in country, lodging arrangements, food, cell phone and internet, communication back home, technology needs. Social media.
- 4:15-4:30 pm - Your questions!

Study Abroad segment, Jan. 2-14, 2018

Tuesday, January 2 *departure of flight to Duesseldorf, Germany*

Wednesday, 1/3 *arrival in Duesseldorf, Germany; transfer to hostel in Duesseldorf*

Walking tour of the city; group dinner and group activity

Thursday, 1/4 *Germany's Energy Transition—the state level: Structures, Players, Status*

Morning through lunch:

- Presentation on energy issues in NRW, organizations/structures for pushing clean energy agenda; work of EnergieAgentur.NRW with municipalities (sessions at offices of EnergieAgentur.NRW)

Lunch—Group hosted by NRW Ministry for Environment, Agriculture, Nature Protection and Consumer Protection

- Discussion with NRW MULNV deputy secretary Dr. Bottermann

Afternoon:

- Window on Minnesota presentation to German ministry partners: 3 student teams report of aspects of MN's energy transition
- Germany's Energy Transition after COP23—guest speaker from Federal Ministry of Economic Affairs and Energy (tbc)

Evening: group dinner and debrief discussion

Friday, 1/5

Morning:

Visit to NRW State Parliament and conversation with representatives of major political parties

Afternoon:

Distributed renewable energy and virtual power plants—NextKraftwerke speaker (tbc)

group dinner and debrief discussion

Evening open for individual activities (doors to hostel close at midnight)

Saturday, 1/6 Cultural Day—Art, Architecture, Refugees

Group visit to Medienhafen urban redevelopment, Kunstmuseen K20 & K21, and refugee grass roots organization

Evening open for individual activities (doors to hostel close at midnight)

Sunday, 1/7 morning:

Departure by train to Muenster; check into Muenster hostel

Afternoon:

Walking tour of Muenster, one of Germany's largest university towns and Germany's acknowledged "bicycle capital" (pop. 300,000 including 55,500 students); visit to Muenster Peace Hall

Evening:

Group dinner with special guests from University of Applied Sciences Muenster (Dr. Christoph Wetter and students)

Monday, 1/8 Germany's energy transition and applied research:

Group hosted by University of Applied Sciences Muenster International Office

Tuesday, 1/9 Saerbeck site visit day 1: Germany's energy transition at the municipal level—Applying and developing technical solutions

Focus on Saerbeck's bioenergy park (biomass, wind power, PV arrays, energy storage concepts, combined heat and power, micro grids)

Speakers/hosts: Wilfried Roos, Mayor of Saerbeck; Guido Wallraven, city planner and technical director for Saerbeck's climate-smart community projects; Dr. Christoph Wetter, University of Applied Sciences Muenster

site visit to Saertex manufacturing company (tbc)

Wednesday, 1/10 Saerbeck site visit day 2: Germany's energy transition at the municipal level—How to create multi-stakeholder alliances

Focus on Saerbeck's comprehensive communications strategy

Host: Guido Wallraven, city planner and technical director for Saerbeck's climate-smart community projects

- "The energy transition takes place in people's heads"—presentation by Guido Wallraven and discussion
- Visit to local high school and conversation with teachers
- Workshop: student teams develop a communications strategy for 2 MN settings
- Community forum for Saerbeck citizens (tbc): Window on Minnesota's energy transition—students and U of M instructors present

Thursday, 1/11 Integrated Approaches in a large city: City of Muenster.

Host: City of Muenster

Seminar session, bike tour, and site visits

- Climate change and city action
- Multi-modal transportation systems
- Low-energy public building (public child care facility)
- Muenster as a city of peace and solidarity: from the 1648 Peace of Westphalia to today's solidarity with arriving refugees

Friday, 1/12 Germany's energy transition and the water-energy nexus

Host: Dr. Christoph Wetter, University of Applied Sciences Muenster

Seminar and hands-on day at water lab

Saturday, 1/13 morning open for individual activities; train to Frankfurt

Sunday, 1/14 *departure from Frankfurt airport to MSP; same day arrival at MSP*