



**UNIVERSITÀ DEGLI STUDI
DI CAGLIARI**



**Master Universitario di II livello in
Digitalizzazione del Sistema Elettrico per la Transizione Energetica**
Tyrrhenian LAB

Transformation of the electric power business

26, 27, 28 February 2024
Università degli Studi di Cagliari
Aula DIRSI 1
Via Università, 40
Presented by
Fereidoon Sioshansi, Ph.D.
Menlo Energy Economics
Master Class Syllabus

Synopsis:

The Master Class consists of 3-days of intensive, interactive lectures by Dr. Sioshansi covering 8 topical areas in the electric power sector including:

- The fundamentals of the electric utility business model and its evolution to the present time
- The transformation of the utility value chain;
- The decentralization & digitalization of the “behind-the-meter” devices;
- Innovation & disruption at the “grid’s edge”;
- Climate change & energy transition;
- Consumer diversification into *prosumer*, *prosumager*, *nonsumer* & *flexumer* ;
- The emergence of new utility business models enabled by smart aggregation, electronic platforms and distributed energy resources (DERs); and
- Future of utilities; Utilities of the future including how to apply the lessons learned.

The lectures are supplemented by a number of virtual presentations featuring distinguished invited guest speakers from Italy, the UK, Spain, Germany, Sweden and the USA describing actual examples, applications and innovative business models relevant to the topics of the lectures.

The attendees shall get exposure to a wide range of issues on the economics, business, technology, environment and regulatory aspects of the rapidly evolving electric power sector.

There will be a test at the end of lectures to evaluate how much of the delivered content was absorbed and retained by the attendees.

Link for registration: [REGISTER NOW](#)

The seminar will take place at the AULA DIRSI1– Università degli Studi di Cagliari, via Università, 40, Cagliari and on the Teams platform at this [link](#).



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Program

DAY 1: Monday 26 Feb

- 9 am **Welcome & Introduction by Professor Fabrizio Pilo**
- 9:10 am **Overview, schedule & format**
- 9:45 am **Lecture 1: Fundamentals of electric utility business**
How did the traditional regulated utility business model evolve over time
How did we get to where we are?
What has changed/is changing & why?
Why the “traditional” model is no longer sustainable?
Proposals & efforts to reform
Introduction of today’s guest speakers
40 slides
- 10:45 am Break
- 11:15 am **Lecture 2: Transformation of the electric power business**
Describe the transformation of the utility “value chain”
Focus on the 4 main segments
Generation: Renewable & variable => Feast or famine
Transmission: Caught between changing supply & demand
Distribution: Two-way flows, localized congestion
Customers, demand, behind-the-meter, DERs, VPPs
Message: It’s no longer your parents’ utility business
- 12:15 pm Break
- 1:15 pm **Guest speaker #1 (virtual):**
El. Mkt. Reform proposals in the EU/UK
David Robinson, Oxford Institute for Energy Studies (OIES)
The speaker will provide the context for the need for **electricity market reform** (EMR) followed by an overview of recent developments. The EU has adopted a market design. The speaker will explain what has been decided and point out the implications- namely a fair number of national systems that rely on government subsidies (because spot market prices will be too low to justify investment and those prices will influence PPA and term markets). This could well mean expensive electricity systems and a risk of stranded (underutilized) assets as consumers self-generate/store and rely as little as possible on the system.
- 2:15 pm Break
- 2:30 pm **Lecture 3: Decentralization & digitalization**
Impact of decentralization on power flows, relationships & service needs
Impact of digitalization on devices & demand
Opportunities & obstacles are defined by
Technology: What is possible
Economics: What is commercially feasible/profitable
Regulations: What is permitted, encouraged, subsidized, etc.
- 3:30 pm Break
- 4:00 pm **Guest speaker #2 (virtual):**
Giacomo Terenzi, TERNA
Overview of Terna’s transmission expansion plans
Or alternative speaker
Alberto Bincardi, GSE
Overview of GSE’s priorities and programs
- 5:00 pm Break
- 5:15 pm Late session to coincide with California time
5:15 pm Italy = 8:15 am CA
Guest Speaker #3:
Utility business transformation & the role of energy storage
Alva Svoboda, Pacific Gas & Electric Company, San Francisco, CA
- 6:15 pm End of day 1



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DAY 2: Tuesday 27 Feb

- 9 am **Guest speaker #4 (virtual):
Regulatory perspective
Luca Lo Schiavo, ARERA, Italy**
- 10:00 am Break
- 10:15 am **Lecture 4: Innovation & disruption at the grid's edge**
What is "the grid's edge?"
Distributed energy resources (DERs)
Distributed generation (DG)
Distributed storage including EVs
Demand response (DR)
Energy efficiency (EE)
Emerging trends in "smart" aggregation, optimization, AI
Emergence of "agents" & "intermediaries"
How customer service needs are changing
Emergence of "nonsumers"
Micro-grids & energy communities
Opportunities for "prices-to-devices"
Examples: California's MIDAS pricing scheme as a "game changer", Transactive energy & the role of "agents"
- 11:15 am Break
- 11:30 am **Lecture 5: Climate change & energy transition**
What is "energy transition" & why it matters
What is the main driver of the "transition"
How & why energy infrastructure/energy flows have to change
Speed & scale of "transition"
Bottlenecks & unintended consequences
Examples: 2,000 GW in interconnection queues in US, 260 GW of offshore wind in North Sea, China's dominance in PVs, EVs, batteries, etc.
Introduction to today's guest speakers
- 12:30 pm Break
- 1:30 pm **Guest speaker #5 (virtual):
Demand flexibility services & trading platforms
Pilar Sanchez, Piclo Energy**
- 2:30 pm Break
- 2:45 pm TBC
- Guest speaker #6 (virtual):
Virtual power plants (VPPS)
Lotte Lehbruck, Next Kraftwerke**
Overview of NK's business model, history, growth, future expansion
How does Next Kraftwerke aggregate loads & generation
How does the VPP concept actually work?
- 3:45 pm Break
- 4:00 pm **Lecture 6: Customer stratification & behind-the-meter (BTM)**
The fable of Rip Van Winkle
What is customer "stratification"
Consumer => Prosumer
Prosumer => Prosumer
Next: Flexumer, nonsumer
Why customers are migrating away from uniform/regulated bundled services
Who will pay for the regulated T&D networks of the future
Featured books: The future of decentralized distribution networks, Behind & beyond the meter, Consumer, prosumer, prosumer
- 5:00 pm End of day 2



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DAY 3: Wednesday 28 Feb

9:00 am **Lecture 7: Utility business models**

New services, new relationships & emerging business models
The emergence of Distributed Energy Resources (DERs)
Micro-grids/community energy

Examples:

Stanford University micro-grid
Sunnova Energy's proposal

Featured books:

Energy communities
The future of decentralized distribution networks

10:30 am Break

11:00 am **Lecture 8: Future of the Utilities/Utilities of the Future**

Scenarios of the evolution of utilities
Disaggregation & re-aggregation of services
Bifurcation of energy vs. delivery or energy services
What future customers need from energy service providers?
Energy
Energy delivery
Aggregation, energy management & optimization
Reliability & balancing services

Recap

Featured books:

Variable generation, flexible demand
Future of the Utilities, Utilities of the Future

12:30 am Break

1:00 pm 1 pm Italy = 7 am Boston time

TBC

Guest speaker #7 (virtual): New business/new business models
Shwan Lamei, CEO, Emulate Energy

2:00 pm Break

2:15 pm Test/Evaluations

3:15 pm Adjourn master class

End/