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The First RE100 University in Japan-Responsible Consumption and Production of Energy-

Sachihiko Harashina
President, Chiba University of Commerce
1-3-1, Kohnodai, Ichikawa, Chiba, 272-8512 Japan
*corresponding author: sahara@cuc.ac.jp

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Abstract. Proactive use of renewable energy is required to create a sustainable energy society, which is related to the various goals of the SDGs such as SDG7 on energy, SDG13 on climate action and SDG12 on responsible consumption and production. Addressing the energy issue as a university is significant in two ways. First, universities can influence other entities, such as businesses, local governments etc. Second, universities have a mission to educate students who can transform society into a sustainable one. In a press release of 2014, I announced the intention of making CUC the first 100% renewable energy university in Japan, which was a voluntary action. After becoming the president in 2017, this became an official project of the university, enabling investment in the necessary facilities. From the experience of having achieved our goal, I will explain the factors leading to our success and the lessons applicable to other universities.

Keyword:

SDGs, responsible university, zero carbon campus, renewable energy, heart-ware

1. Introduction

"Renewable Energy University League of Japan"

To create a sustainable energy society, proactive use of renewable energy, away from fossil fuels and nuclear power is required. Energy issues are related to the various goals of the SDGs. Addressing this issue as a university has is significant in two ways.[1]

First, on its own, the university can influence other entities, such as businesses, local

governments, public organizations, and NGOs. Society would begin to change when each social entity starts working towards creating a sustainable decarbonized society by using 100% renewable energy. Universities can lead this change.

Second, universities have a mission to educate students who can transform society into one powered by 100% renewable energy. To do so, it is necessary for us to set an example through practical learning by each university achieving 100% renewables. This is really living education.

Towards this goal, we established the "Renewable Energy University League of Japan" on June 7, 2021, by bringing together universities, faculty members and staff, and students who share this vision, as well as the experts who support them, to study with each other and take action.

As a first step, we set our goal to become an RE100 University with 100% renewable energy in terms of electricity. We will start by declaring to be an RE100 University and move forward step by step, each at its own pace. Eventually, we aim to convert all of our energy supplies, including heating and transportation, to renewable energy.

We established a league of universities that meet the criteria to carry this out together.

1. The university decides and announces its decision to produce or procure renewable electricity by a self-determined timeframe before 2030 or 2040 at the latest, based on a target for the amount of electricity used by the university (or on campus).
2. The university will make a concrete plan to meet its target and implement the plan.

The aim of establishing the league is to promote multi-stakeholder action for renewable energy towards decarbonization. I called on the university presidents to join us.

The following nine university presidents are leading the "Renewable Energy University League of Japan" and we held the inaugural meeting and a press conference in Tokyo, June 6, 2021;

Sachihiko Harashina (Chiba University of Commerce) serves as the representative of the party, and other members are Shoichiro Iwakiri (International Christian University), Koji Kishida (Wayo Women's University), Toshiaki Kohso (University of the Sacred Heart), Kayoko Hayashi (Tokyo University of Foreign Studies), Masumi Kindaichi (The University of Nagano), Yoshiaki Terumichi (Sophia University), Mitsuo Ochi (Hiroshima University) and Yujiro Tanaka (Tokyo Medical and Dental University).

2. Responsible Consumption and Production of Energy

The idea of establishing the University League stemmed from the concept of the role of universities towards creating a sustainable society. We are responsible for producing electricity from decent and sustainable energy sources. Considering the negative impacts caused by energy sources, it is clear that neither nuclear power nor coal-fired thermal power is suitable [2][3].

Major companies of the world, therefore, have voluntarily started to procure 100% renewable electricity. This is the RE100 initiative of the Climate Group since 2014. RE100 is a strategy targeting big companies consuming a great volume of electricity (more than 100GWh annually), to increase the production of renewables through procurement. But a 100% renewable energy society would not emerge by this framework alone. We must increase the production of renewables by various stakeholders [4].

The RE100 could be expressed as *RE100-consumption*. I define another, *RE100-*

production, as everyone being responsible for producing renewable electricity by itself. The electricity produced could be either for one's own consumption and/or sold to others. When a university is working in this way, we can call it an RE100-production university or RE100 University. This has a constructive meaning. It is applicable to SDG12 Responsible Consumption and Production, applied to energy. I believe it is of great value to produce electricity using renewables and supply it to society.

Optimal renewable energy will differ depending on the natural conditions of each area. The possibility of producing renewables would increase if we consider doing it not only within our own property but also at nearby sites. If every stakeholder in society acts under this concept, and the total power consumption of the society becomes equal to the total production, the next stage is to consider how to circulate power in society, which is the role of commerce.

Renewable electricity is variable but not unstable with the appropriate application of technology. As we have plenty of energy sources from nature in Japan, such as solar, wind, small-scale hydro, biomass, geothermal etc., we could make use of those in the best mix suitable for each area.

To spread this idea in a society, in particular among the university community, CUC has been making efforts to show a model of an RE100 University, as the first penguin or the first challenger, and we achieve the goal in 2019 [5]. (Photos 1 and 2)

Figure 1. Mega solar power plant of Chiba University of Commerce in Noda City (capacity: 2.88 MW)

Figure 2. Rooftop solar panels on the buildings, CUC Ichikawa campus. Ten buildings have these.

3. Towards the first RE100 University in Japan

The story is illustrated in my following presentation at the ICU Workshop in 2020 [6]. I came to CUC in 2012, after retiring from the Tokyo Institute of Technology and tried to make CUC contribute to a renewable energy society. But it was not easy to spread my idea at CUC. To share this idea with my colleagues, I started the CUC Open Seminar Series at our satellite campus in Tokyo, from 2013. The theme of that year was "Considering Sustainable

Environment and Energy Policy". In the same year, CUC built a mega solar power plant of 2.45 MW capacity, at the site in Noda, and it started operation in April 2014. A university in the social sciences usually does not have big generation facilities, but CUC installed a mega solar system as a profitable project by applying the Feed-in Tarif (FIT) in2012. At the time, CUC had no idea of becoming a 100% Renewable Energy University.

In the spring of 2014, I held a series of joint seminars with my colleagues at the Faculty of Policy Informatics. I also invited members of the Eco-League, an NGO comprised of students from various universities, and they said that the mega solar system of CUC was the biggest of all the universities in Japan at the time. When we estimated the coverage of electricity generated, it was 62.7% in 2013. In the press release of September 4, 2014, I announced the intention of making CUC the first 100% renewable energy university in Japan [7]. The announcement was made not as CUC officially, however, just as an individual professor.

To realize this, we had to make a decision on investment. In 2014, an expert working to promote local energy advised us strongly to conduct a survey on the possibility of becoming a net-zero energy campus by saving energy and producing renewable energy. He applied to obtain a subsidy from the Ministry of Economy, Trade and Industry (METI) for the survey on CUC.

It was impossible to achieve 100% renewable energy by just promoting energy saving activities. The key factor for the success of the project was the investment decision. In 2015, fortunately, we obtained the METI subsidy mentioned above. We formed a committee including the top management of CUC, because their understanding of the project was essential. The study found that the first priority was changing all the lights to LED lights, which was most cost-effective.

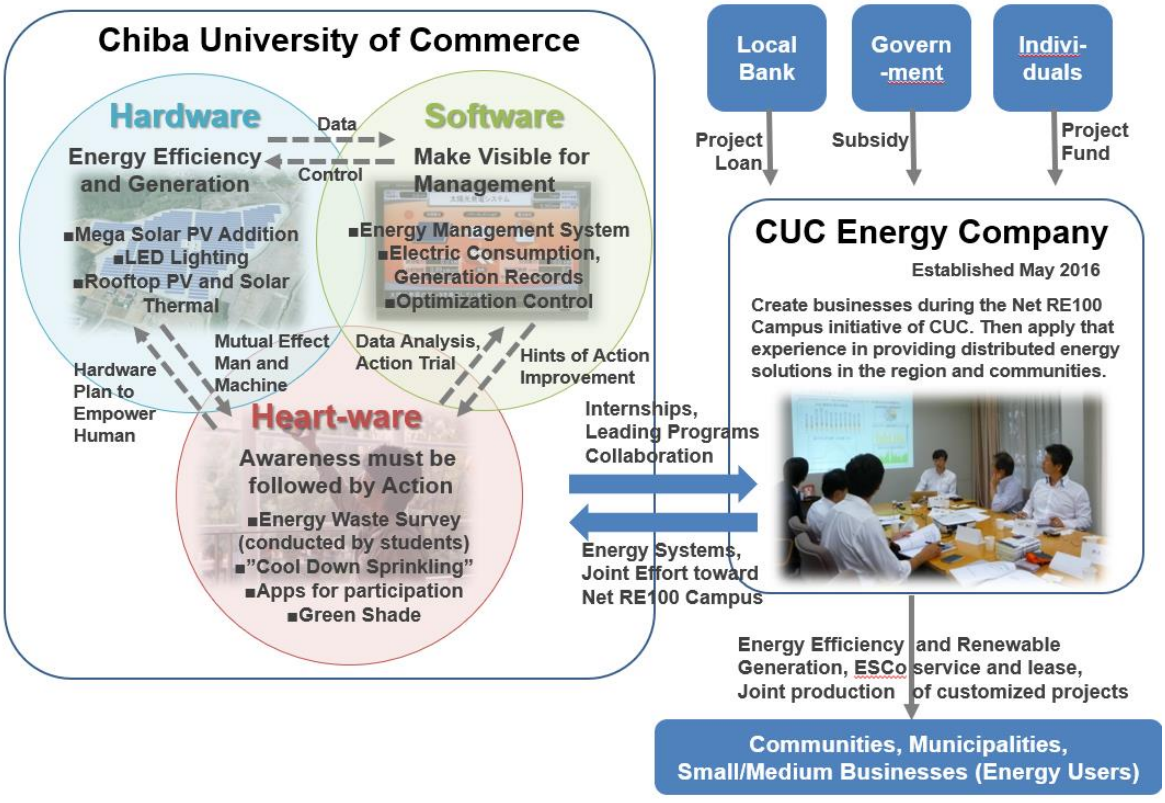

Figure 3. Chiba University of Commerce and CUC Energy Company

My approach comprises hardware, software, and heart-ware. Heart-ware is awareness which leads to concrete action (Fig.1). Heart-ware is especially important for decision makers. If they have high awareness, it leads to actual investment decisions. To build consensus on the investments, understanding is essential. In addition to the CUC Open Seminar Series, we have been holding other events to raise awareness since 2016 such as holding an energy-saving week in July, including "Cooling Down by Sprinkling Water" with students, faculty and staff.

4. Development as a President's Project

In 2017, I made the project one of President's Projects. We set out two goals [8].

Environmental Goal 1 (by March, 2019):

To become the first 100% Renewable Energy University (electricity) in Japan

Environmental Goal 2 (by March, 2021):

To become the first 100% Renewable Energy University (electricity + gas) in Japan

We invested in installing the required facilities. We were able to reduce the cost of replacing the lights with LED lights through CUC Energy Company, which obtained a subsidy from the MOE for the purchase, and the company made a financing lease to CUC. We saved 25% of electricity by this. The addition of solar panels at the Noda site raised the capacity to 2.88MW (16% increase). (Photo 1)

We held a press conference at the Japan Press Center, Tokyo, in November, 2017, where we announced our goal of becoming a 100% renewable energy university in Japan, and it was registered with the RE100 Platform of CAN-Japan. Our plan was well recognized by the MOE, and in December, we received the ministry's Cool Choice Leaders Award.

Though the major contribution to achieving 100% was made by installing facilities, the energy-saving activities of the students on campus also contributed, albeit in a small way. For instance, a student group voluntarily made a proposal to reduce the electricity consumed by vending machines on campus, and it was realized. Other students established the Student Organization for Natural Energy (SONE) in March 2018. The group has been working on energy-saving measures on campus in collaboration with the university. Another students group started a trial cultivation of grapes for wine in the spring of 2019, a showcase for solar sharing. These activities had the support of the faculty and staff.

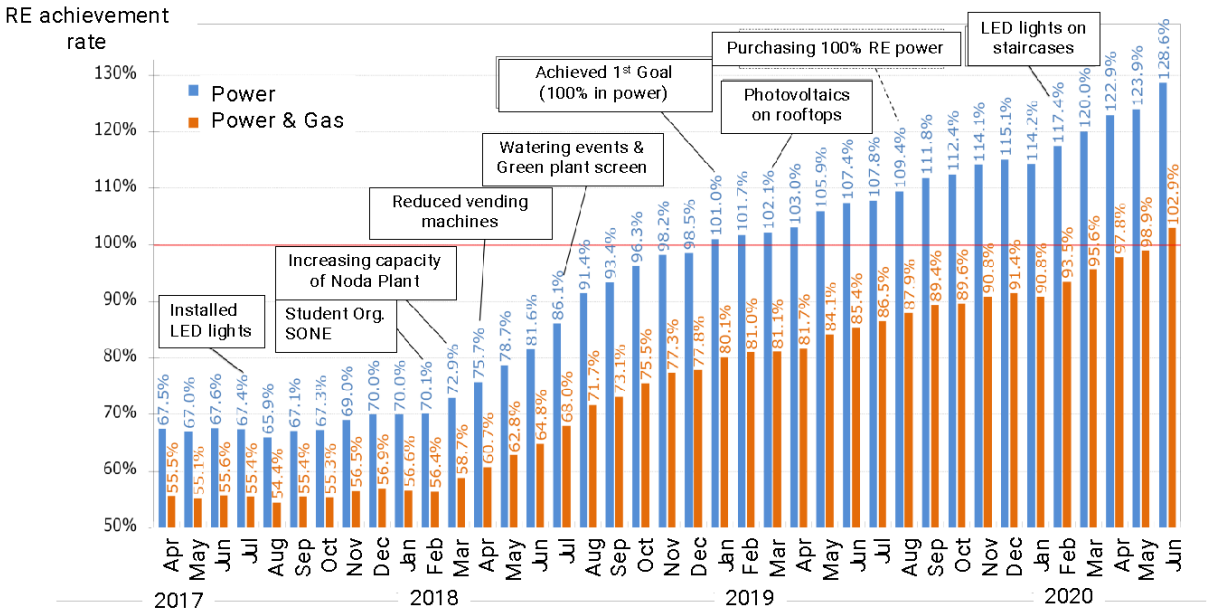

Figure 4. How the goal was achievement and main events

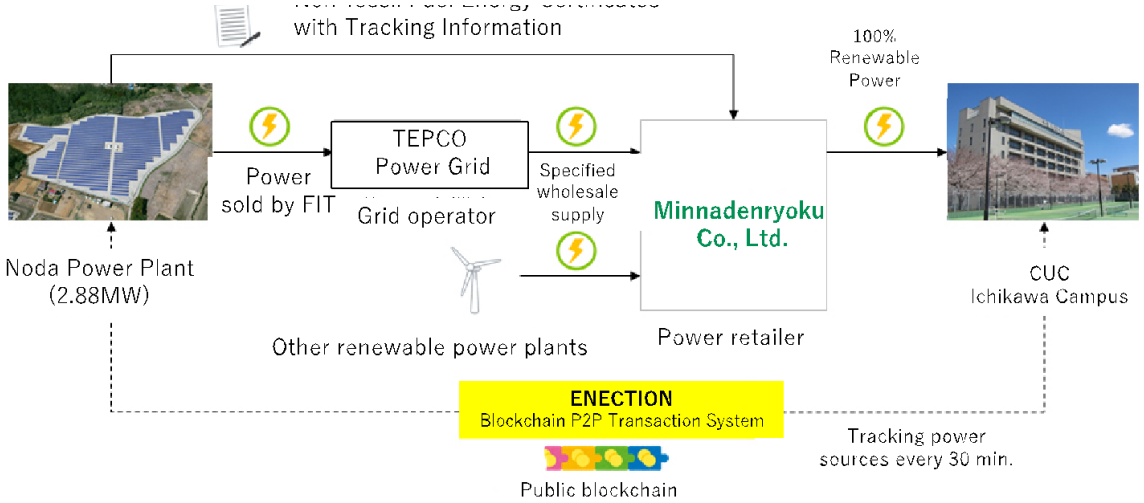

Figure 5. Power purchasing scheme for the Ichikawa Campus

CUC achieved the **Environmental Goal 1** in January, 2019, and became the first RE100 University which is *RE100_production*, in Japan (Fig.2). The power usage in 2018 was 3.65 GWh, and the renewable power generated in the same period was 3.69 GWh. We generate renewable power with the solar panels at the Noda Plant and on the rooftops of ten buildings on our Ichikawa campus (Photos 1 and 2). Most of the generated power is sold and the remainder is consumed on site.

CUC introduced the RE100 plan of Minna Denryoku (non-fossil certificate with tracking) in August 2019 (Fig.3). In this way, we became the first university of 100% renewable energy in procurement which is RE100_counsumption, in line with the definition of RE100 by the Climate Group. CUC achieved SDG12, which is responsible for the consumption and production of energy.

We became the first university to join the “Renewable Energy 100 Declaration RE

Action," which was established in 2019. As president, I released an urgent message, a Climate Emergency Declaration, from CUC. On February 18, 2020, we also became the first university in Japan to sign the "Global Universities and Colleges for the Climate" agreement, of UNEP, EAUC and Second Nature. We also registered the Race to Zero campaign under the UNFCCC.

5. Concluding Remarks

What are the lessons we learned from our experience? We were able to promote the RE100 project with the understanding of the CUC people as we already had a culture of environmental awareness. The opportunity of forming this culture at CUC was born with the starting of the Faculty of Policy Informatics in 2000 [9]. Under the supervision of an FPI professor, the Environmental ISO Student Committee was created in 2001, and the students worked towards acquiring ISO14001 certification. CUC became the first university to acquire ISO14001 certification in 2003, with the movement led by students. As an action of environmental management, the students set a target of reducing, by 2010, CO2 emissions on campus to 10% less than the level of 1990. We achieved this goal in 2010.

Just after the FIT system started in 2012, CUC decided to make use of it. Though the risk of the investment was not small, the management understood the significance of the action to society. They had been working with the students in carrying out environmental management under ISO14001 and no doubt this experience influenced their judgment.

I started the "100% Renewable Energy University" project in the spirit of "the first penguin." or the first challenger. I tried to show that it is possible to produce, by one's own efforts, renewable energy equivalent to the energy usage of a university, by presenting our example as evidence. We were successful. Now this should be followed by the next stage of spreading the activity to other universities through the "Renewable Energy University League of Japan", to transform our society into a sustainable one. Though the members of the League are currently mostly from Japanese universities, I hope that we can include more like-minded people from universities everywhere, to make the League a global one.

I hope that other universities, companies and various other organizations will follow us, and take the first step of setting a concrete goal of generating renewable electricity and start working towards that goal. We are prepared to support their activities in various ways based on our experience. The public sector and the private sector are working together to expand decentralized renewable energy—that is how we can make the transition to a sustainable society.

Note: Awards received as the first RE100 University in Japan

CUC received the following awards for achieving 100% renewable energy (electricity) for the first time among about 780 universities all over Japan.

1) Ministry of the Environment: 22nd Global Warming Prevention Activities Award (for the category of Environmental Education), Dec. 2019
2) ACEEU*: Asia Pacific Triple E Award, "Green University of the Year 2019," Jan. 2020. *Accreditation Council for Entrepreneurial and Engaged Universities, HQ in Germany
3) Energy Conservation Center, Japan: Grand Prize in the category of Energy Saving Examples, Special Award from the judging committee, Jan. 2020
4) New Energy Foundation, New Energy Award, the President Award in the Category of Activities for Introducing New Energy, Jan. 2021

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