

# A sustainable energy system for smart neighbourhoods, communities & cities

## A short introduction of the group members



Jérémie Bernard, 27 years old,  
Bachelor Business Administration,  
HEG Arc, Switzerland

My name is Jérémie Bernard. In March 2019, I had to choose my options for my last year of studies. Immediately, I knew that the Smart CityZens project would be my first choice.

First of all, I feel very excited to think about what the "smart" cities of tomorrow might look like. Then, I really like to travel, discover other cultures and countries.

I have the luck to work on the topic of **decentralized energy system** with a great team. I am not a specialist of this subject and I am glad to have learnt so much about it during an intensive week in Switzerland. As I'm very curious, I am keeping learning about it almost every day.

Please, have a look at our article and enjoy getting information about this fascinating topic.



Daniil Bugai, 21 years old,  
Specialist Computer Security,  
OmSU, Russia

My name is Daniil Bugai. I am a computer security specialist and a software developer as well.

It is very interesting for me to work on Smart CityZens project with an excellent team, because we are making the future with our own hands. It looks like the future, but it is almost the present and we are going to make it as closer as it can be.

So, the first week of project showed me what I need to learn about this subject to be more useful for the team. The topic was new for me and it is always great to discover something interesting and new.

I am looking forward to seeing what our project will become.



Simon Müller, 29 years old,  
Bachelor Business Administration,  
FHNW, Switzerland

My name is Simon Müller. I am lucky to be a part of the Smart CityZens project. I own the company «Müller Energielösungen».

This is a small company that invests in renewable energy solutions. I have realized six solar energy farms and have two projects to deal with before the module starts.

After the first project week I was excited. It was a great experience although I am not used to work in an intercultural context. But I was very lucky and blessed with great team members.



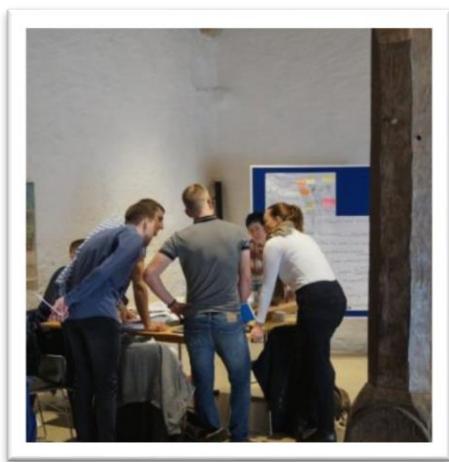
Robert Naumov, 19 years old,  
Economic Security, SSEU, Russia

My name is Robert Naumov. I am a specialist in economic security and the economy as a whole.

When I found out that I was in the Decentralized Energy group, my first words were "what is it?" I began to understand, read articles and realized that not everything was too complicated and even very interesting.

Of course, this is not my direct sphere, but it is necessary to develop in other areas too. Especially when you are surrounded by such a great team like ours!

## First working day: Cooperation between Russia and Switzerland



As a group we met each other for the first time the 10<sup>th</sup> of February 2020 in Basel. We started to talk about our competencies, the topic, tried to understand what the task was about. Each of us had different and new point of views concerning the subject of decentralized energy systems in Smart Cities. Swiss students talked about sustainability, Russians talked about gas and oil. The IT specialist talked about data security. The economists tried to save costs. The entrepreneur spoke about opportunities.

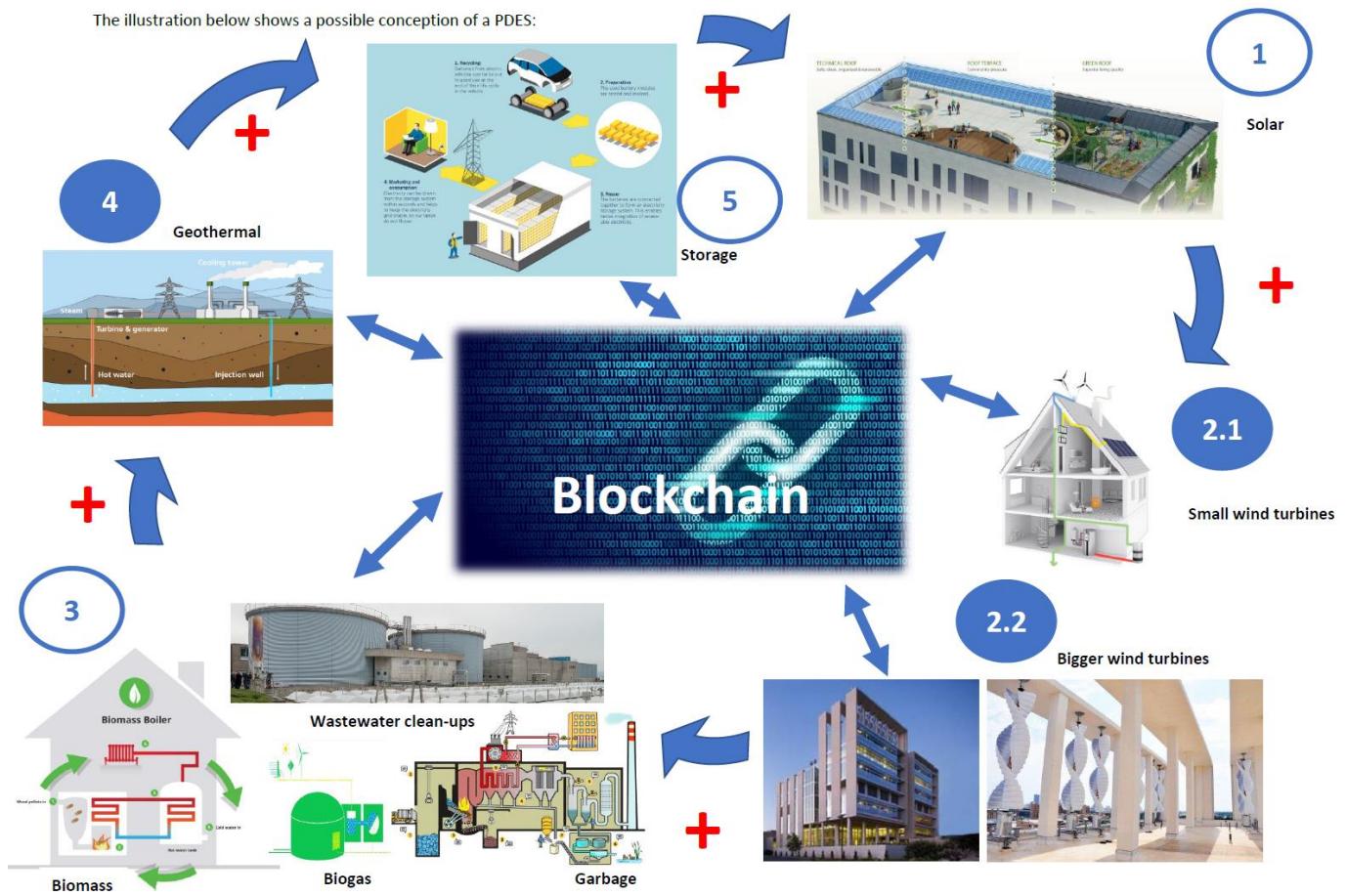
We had to build a common ground. What did a Smart City mean to us? What was the difference between decentralized and centralized energy systems? What kind of problems did we face with decentralized systems? How could we solve these problems? We invested some time to define our goals and how we wanted to work together. We built a foundation for our work based on respect, wishes and expectations. Once we have built the foundation, we were in an excellent position to continue our work.

### Our proposition: A predictable decentralized energy system

After four days of work, exchanges, researches and coaching, we came to a first idea of outcome that we decided to call PDES (Predictable Decentralized Energy System).

This solution proposed by our group consists of mixing different kind of sustainable energy systems. This mix aims to provide a fix amount of energy both overnight and during the day by the substitution of a system by another. It is as well possible that a single energy system cannot cover the overall requirements of the inhabitants or communities. Therefore, it has to be supplied by another source of power that could be solar, wind, garbage or biomass energy system.

The illustration below shows a possible conception of a PDES:



A system we are looking forward to implementing in our PDES is the potential to produce biogas from wastewater. Neuchâtel is exploiting this system and it could be very suitable and promising for the Wolf area in Basel as well as for big cities in Russia (Omsk, Samara). Information about this technology are currently being taken with the authorities of Neuchâtel.

There is not a single way to make concrete proposition of our PDES, the “one best way” does not exist because there are plenty of opportunities to address the energy challenges that our society is facing. It is necessary to adapt to the reality of everyone. In that order, we are currently working on a program that could calculate the best mix of energy systems based on data insert into the program. Thanks to a comparison costs-efficiency, we are going to be able to suggest the most effective combination for our business partners. Their budget, geographic situation, legal restrictions and energy needs are going to be taken into consideration.

### **Challenges encountered**

During our work we faced some problems and we had to solve all of them.

The main challenge we faced in realizing a decentralized energy system was to make it predictable. There cannot be situations where our system does not work. Especially when people need energy for their living. The energy system has to be able to provide it. It must be ready to work in different conditions, for example seasons or times of day. So, the system must be reliable, but how can we make it? It was the main and very important question.

The main but not the only one. We discussed a lot about how to realize the system in

Switzerland, but how can we implement it in Russia? Russia already has a lot of energy from gas and oil. Why should they use our new system? How can we convince Russian people to use it?

How to make our system secure? It was another issue we faced. Transparency and security are important for any decentralized systems. People must be sure that they have no risks.

At the end of the discussion, we have had plenty of problems, but all of them have already been solved.

### **A few words in conclusion**

The first presentation of our project in front of experts took place in Neuchâtel on the 13<sup>th</sup> of February 2020. There were happy and very interested in our work. Experts gave us two main points to work on:

1. Consider the potential of wastewater to produce energy;
2. Produce a tool able to calculate “the best and cheapest mix of energies”.

Point 2 is a huge challenge. We started our researches about the average consumption for electricity and heat. Next we have to think about the potential of each technology and figure out how high the price will be. Finally, we have to put all this complex and connected data into a user-friendly tool. This will not be easy, but we are convinced of it and look forward to our outcome.

Robert presented twice our project in Russia. His statement made a strong impression on the listeners. And they had a discussion to compare the issues between Russia and Switzerland. They concluded that Russia has a problem with garbage sorting and conducted a poll as well which revealed that the people living in small villages did not interest in the decentralized energy. The exchanges with Samara's experts summarize well the situation in Russia:

- Solution like our PDES looks good and suitable for Russian region;
- System like that is our future;
- More time is needed to raise awareness of Russian people.

To achieve our calculation program and identify which part of it can interest Russia, we need to make lots of researches, share articles and knowledge, interview experts and have regular virtual meetings. Our task is consequent, and we cannot wait the second intensive week in Russia. During the mentioned week in Russia we are going to have little time to adjust details and elaborate a strategy to convince experts from Switzerland and Russia.

We are very excited and everybody in the group is giving his best to make our project real. We still have a lot of work to do, but the beginning has already been laid!

Regards,

**Students:** Jérémie Bernard, Daniil Bugai, Simon Müller and Robert Naumov

**Prof. Dr./Coach:** Tina Haisch

