



Energy Modelling  
Platform for Europe

# EMP-E 2021: Re-Energising Sustainable Transitions in Europe

Energy System Modelling, Methods & Results to  
support the European Green Deal

26th to 28th October · online

## Parallel Skills Workshops: 4

Technical possibilities vs. Economic Feasibility:  
The issue of viable business models for  
innovative technologies  
– a modeler's approach

hosted in cooperation  
with the European Commission



# 4ward Energy - Key figures

- Offices in Graz and Vorau
- Turnover 2018: approx. 700.000 EUR
- Foundation: 2010
- Employees: 9



# 4ward Energy - Our Team



# 4ward Energy - Skills and Knowledge

## Different technical disciplines

Projekt-Branding

**White-Board Videos**

Optimisation  
Models

**Energy System Analysis  
and Evaluation**

Self-learning  
Systems

**Business Model  
Development**

**Techno-Economic  
Modelling**

Technology Development  
and Prototyping

Open Innovation and  
Stakeholder Involvement

**Hybrid Energy  
systems**

**(Inter)national funding  
schemes and programs**

**Energy Communities**

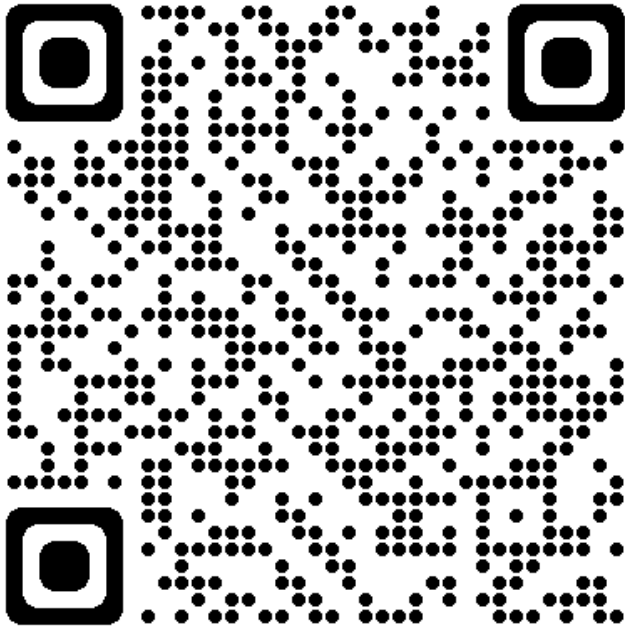
**Smart Grids  
and Systems**

Climate change  
Adaption

**Energy markets  
and Regulation**

**Cross-sectoral  
Technologies**

# Enough about me – tell me about you!



## What is your background?

Go to [menti.com](https://menti.com) and insert the following code:

**6208 1984**

Or use the QR-Code on the right with your mobile



# Enough about me – tell me about you!

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## What is your background

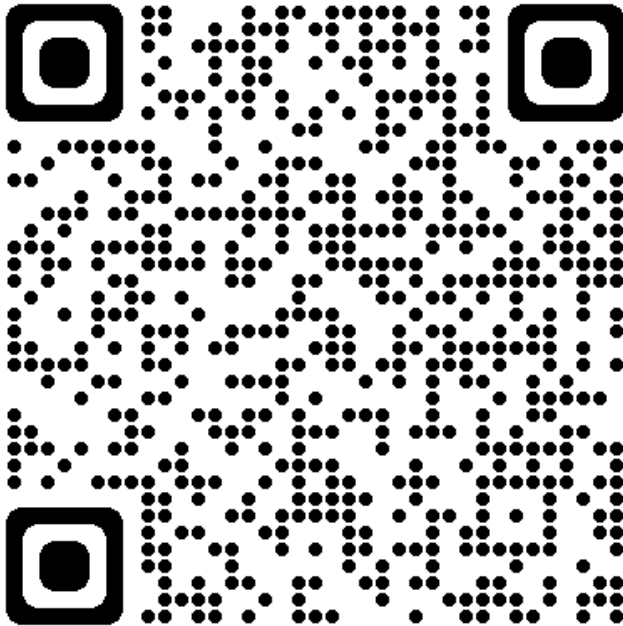
research management  
energy system analyst  
spain research  
**researcher** energy  
techno-economic analysis  
scientist physics  
électrical engineering

Press S to show image

Mentimeter



# Enough about me – tell me about you!



## Why are you here today?

Go to [menti.com](https://menti.com) and insert the following code:

**2103 0910**

Or use the QR-Code on the right with your mobile

# Enough about me – tell me about you!

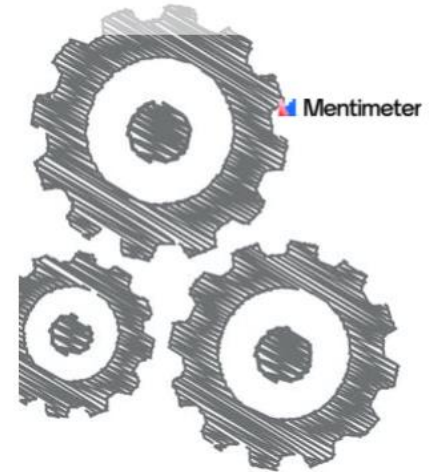
Go to [www.menti.com](http://www.menti.com) and use the code 2103 0910

## Why are you here today?

general business develop  
broaden knowledge  
business model support  
**business models**  
business decision making

modeling

Press S to show image





# Why are we here today?

## Conflict between technical optimisation and economic parameters

- Feasibility is often the main criteria for technical modelling
- Technical optima mustn't necessarily result in economic optima
- CAPEX and OPEX don't necessarily paint the whole picture
- Economic feasibility is not necessarily the most relevant aspect
- It is all a matter of perspective and boundaries!

# Where to start? - Specifications



## Technical optimisation – a modeler's viewpoint

- Detailed Models of technical components
- Consideration of multiple parameters and variables influencing performances
- Technically driven Key-Performance Indicators (Efficiency, lifetime, operational cycles, etc.)
- Might consider some economic parameters, but will not consider a full fledged business model
- Assumption of technologies without consideration of costs (**happens all the time**)

# A simple example

**Technical sizing of a PV on the roof of a house**  
Single household (H0 Standard Load-profile)  
wants to build a PV-generator.

Purely technical KPI:

- Own-Consumption rating
- Autarky rating





# Where to start? - Specifications

## Economic optimisation – a modeler's viewpoint

- Strong focus on economic parameters and connections
- Technical models are often used as background
- Technical models are mostly simplified
- Economically driven Key-Performance Indicators (Rate of return, yield, etc.)
- Technological parameters are often assumed and not validated (**happens all the time**)
- Key Factor: Boundaries of the business model!

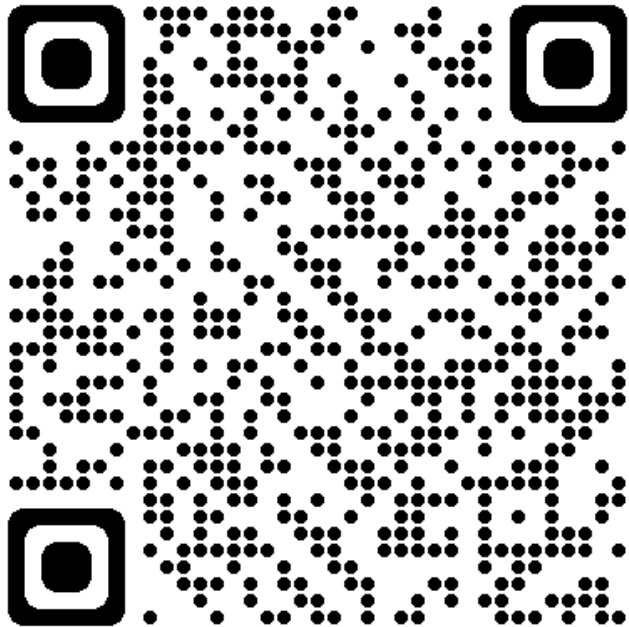


# Any questions so far?





# Time for participation



## How is your experience with techno economic models?

Go to [menti.com](https://menti.com) and insert the following code:

**2040 2146**

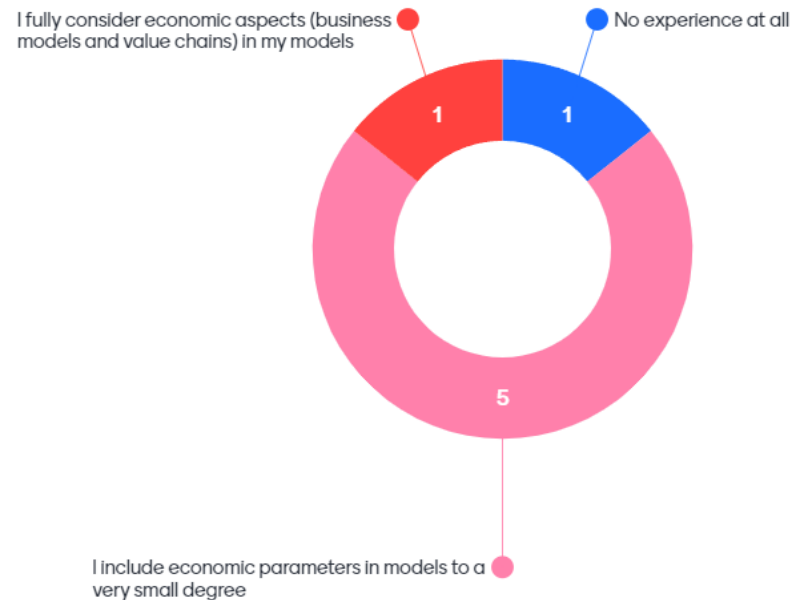
Or use the QR-Code on the right with your mobile

# Time for participation

Go to [www.menti.com](https://www.menti.com) and use the code 2040 2146

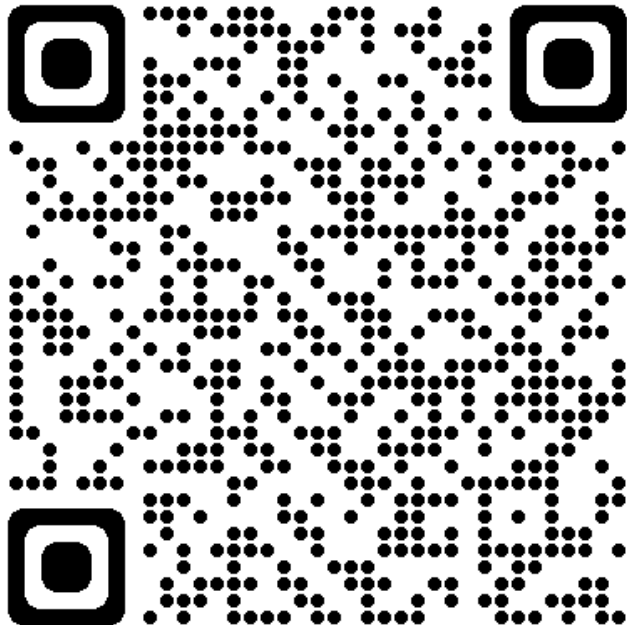
## Experience with techno-economic modeling

 Mentimeter



7

# Time for participation



## How is your experience with techno economic models?

Go to [menti.com](https://menti.com) and insert the following code:

**7247 8595**

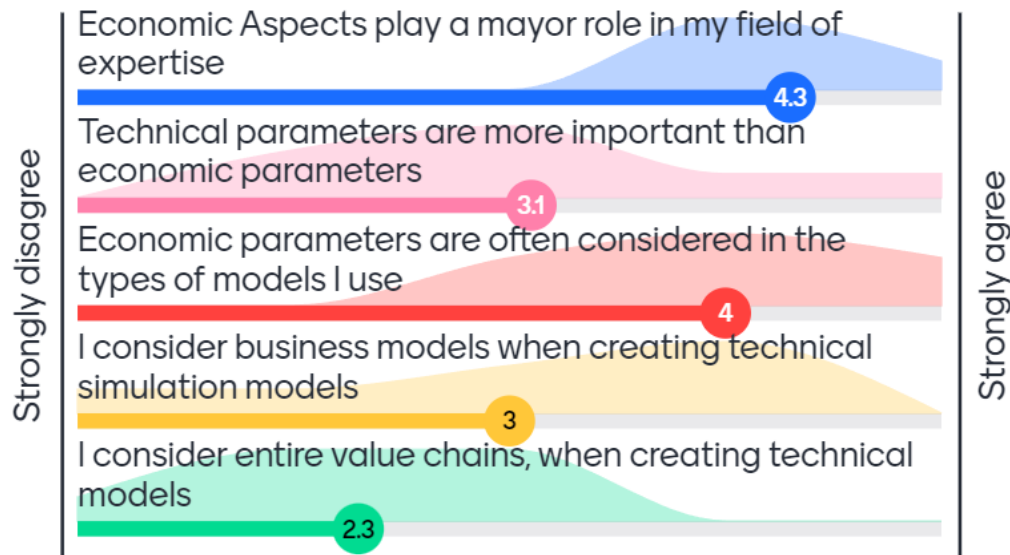
Or use the QR-Code on the right with your mobile

# Time for participation

Go to [www.menti.com](https://www.menti.com) and use the code 7247 8595

## Relevance of business model consideration

Mentimeter

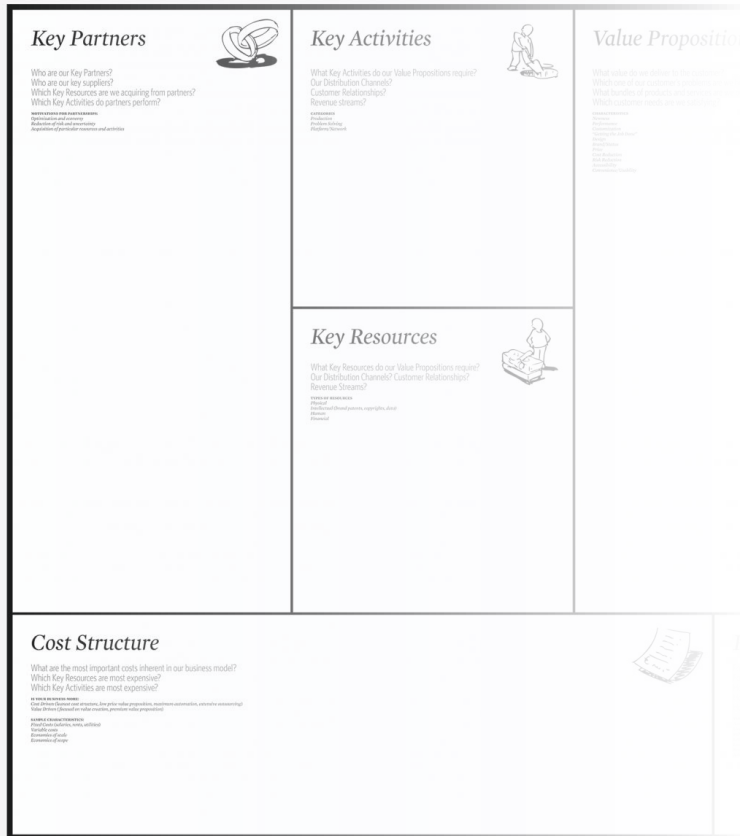


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# Basics – The Business Model Canvas

## The Business Model Canvas

Designed for:



[www.businessmodelgeneration.com](http://www.businessmodelgeneration.com)

## Business Model Canvas

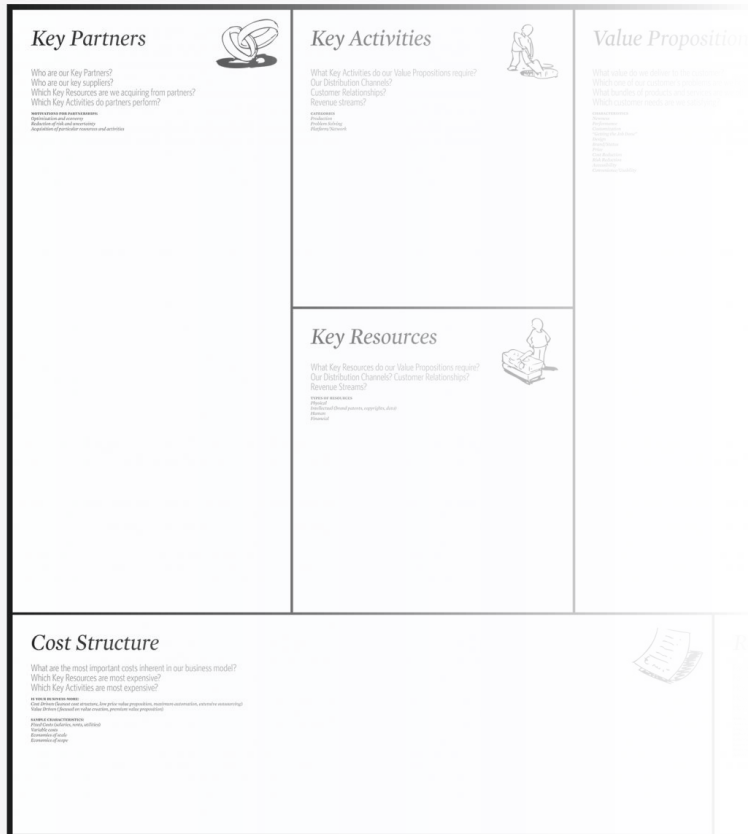
- Structured approach to the abstract term of a “Business Model”
- Consists of 9 fields that describe the structure and connections within our business model
- Sets the focus not only on economic parameters but also on other “soft” factors
- Standardised Template
- Team oriented approach often used to describe a business



# Basics – The Business Model Canvas

## The Business Model Canvas

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## Advantages

- Better understanding of the abstract term of a business model
- Easy and relatable approach for teams or individuals
- Limited spaces requires an „on point“ formulation
- Everything about „your business“ on one page
- Dependencies within the business model are made visible
- Common understanding of „your business“ model

## Personal experience:

- Enables to think outside of the box
- Requires to ask uncomfortable question (is it economically viable, etc.?)
- Most important factors: Cost and Income

# Basics – The Business Model Canvas

## The Business Model Canvas

Designed for:



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## Disadvantages

- Very business model centric – neglectance of the business model environment
- No consideration of the human resource and the interaction of teams
- Strong focus on profit oriented business models
- Differing degree of details in the boxes
- No indication on how to start the business

## Personal experience:

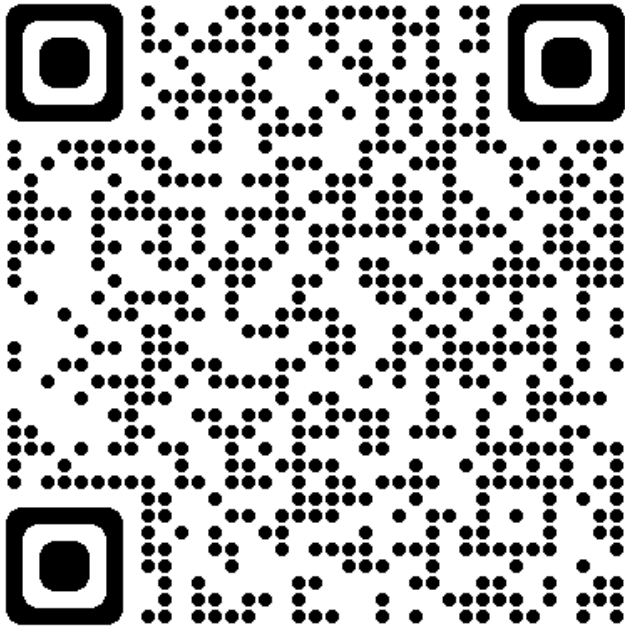
- Needs some time to get used to
- Feels very theoretical at times
- **You need to decide whose perspective you are choosing!**

# Any questions so far?



# Time for participation

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## Have you tried the BMC?

Go to [menti.com](https://menti.com) and insert the following code:

**6374 8917**

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# Time for participation



**WHY**

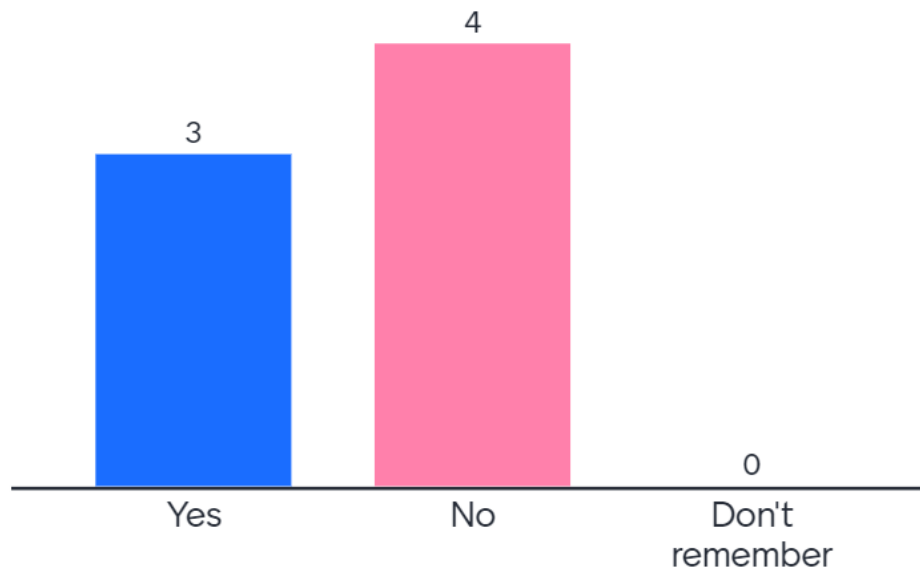
EMP

Energy Modelling  
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Go to [www.menti.com](https://www.menti.com) and use the code 6374 8917

## Have you used the BMC so far?

Mentimeter





# The Business Model Canvas



## The Business Model Canvas

Designed for:

Designed by:

On: Day Month Year

Iteration:

### Key Partners



Who are our Key Partners?  
Who are our key suppliers?  
Which Key Resources are we acquiring from partners?  
Which Key Activities do partners perform?

**KEY PARTNERS**  
Distribution and logistics  
Infrastructure providers  
Regulation of provider resources and activities

### Key Activities



What Key Activities do our Value Propositions require?  
Our Distribution Channels?  
Customer Relationships?  
Revenue streams?

**KEY ACTIVITIES**  
Production  
Distribution  
Customer support  
Platform/Service

### Value Propositions



What value do we deliver to the customer?  
Which one of our customer's problems are we helping to solve?  
What bundles of products and services are we offering to each Customer Segment?  
Which customer needs are we satisfying?

**VALUE PROPOSITIONS**  
Energy  
Customer  
Customer support  
Energy as a Service  
Energy as a Utility  
Energy as a Service  
Energy as a Utility  
Energy as a Service  
Energy as a Utility

### Customer Relationships



What type of relationship does each of our Customer Segments expect us to establish and maintain with them?  
Which ones have we established?  
How are they integrated with the rest of our business model?  
How costly are they?

**CUSTOMER RELATIONSHIPS**  
Personalized  
Personalized  
Personalized  
Personalized  
Personalized  
Personalized  
Personalized  
Personalized

### Customer Segments



For whom are we creating value?  
Who are our most important customers?

**CUSTOMER SEGMENTS**  
New Market  
New Market  
New Market  
New Market  
New Market  
New Market  
New Market  
New Market

### Key Resources



What Key Resources do our Value Propositions require?  
Our Distribution Channels?  
Customer Relationships?  
Revenue streams?

**KEY RESOURCES**  
Human  
Human  
Human  
Human  
Human  
Human  
Human  
Human

### Channels



Through which Channels do our Customer Segments want to be reached?  
How are we reaching them now?  
How are our Channels integrated?  
Which ones work best?  
Which ones are most cost-efficient?  
How are we integrating them with customer routines?

**CHANNELS**  
1. Direct  
2. Indirect  
3. Direct  
4. Indirect  
5. Direct  
6. Indirect  
7. Direct  
8. Indirect

### Cost Structure



What are the most important costs inherent in our business model?  
Which Key Activities are most expensive?  
Which Key Resources are most expensive?

**COST STRUCTURE**  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy

### Revenue Streams



For what value are our customers really willing to pay?  
For what do they currently pay?  
How are they currently paying?  
How would they prefer to pay?  
How much does each Revenue Stream contribute to overall revenues?

**REVENUE STREAMS**  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy  
Energy

# The Business Model Canvas

## The Business Model Canvas

Designed for:

Designed by:

One:     
Iteration:

### Key Partners

Who are the partners that help you reduce risk and costs, increase revenue and deliver value?

### Customer Segment

- Who are your customers?
- What problem are you solving for them?
- What is their background?
- What is their financial status?
- What are they interested in?

### Propositions

### Customer Relationships

What kind of relationship does your customer expect? What kind of relationship can you provide? How do you create, build and maintain this relationship?

### Customer Segments

For whom are we creating value? Who are our most important customers?

### Cost Structure

What are the most important costs involved in your business model? Which of these costs can you reduce? Which of these costs are essential?

### Personal experience (Helps with the question):

- Am I even modeling the relevant things?
- Are there relevant constraints I am forgetting?

### Revenue Streams

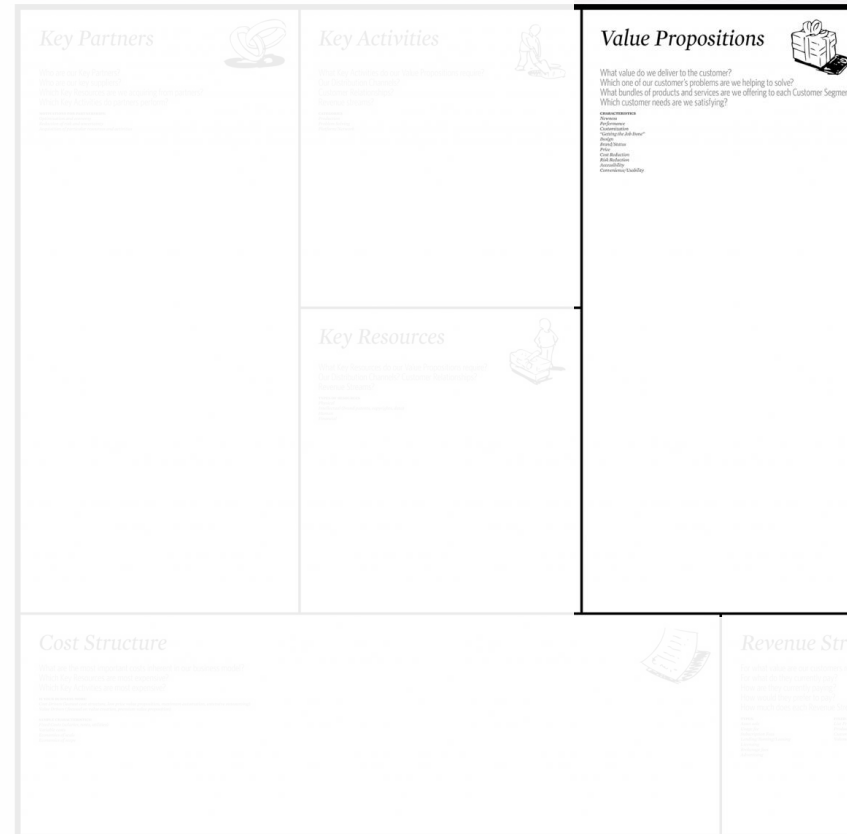
What are the revenue streams of your business model? How do you create, build and maintain these revenue streams?

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# Business Model Canvas

## The Business Model Canvas

Designed for:



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## Value Proposition

- What are we actually proposing?
- What is the benefit of our product?
- Why should someone buy our product?
- What makes our proposal unique?

## Personal experience (Helps with the question):

- What target functions do I need?
- What are the general conditions I need to consider?

# The Business Model Canvas

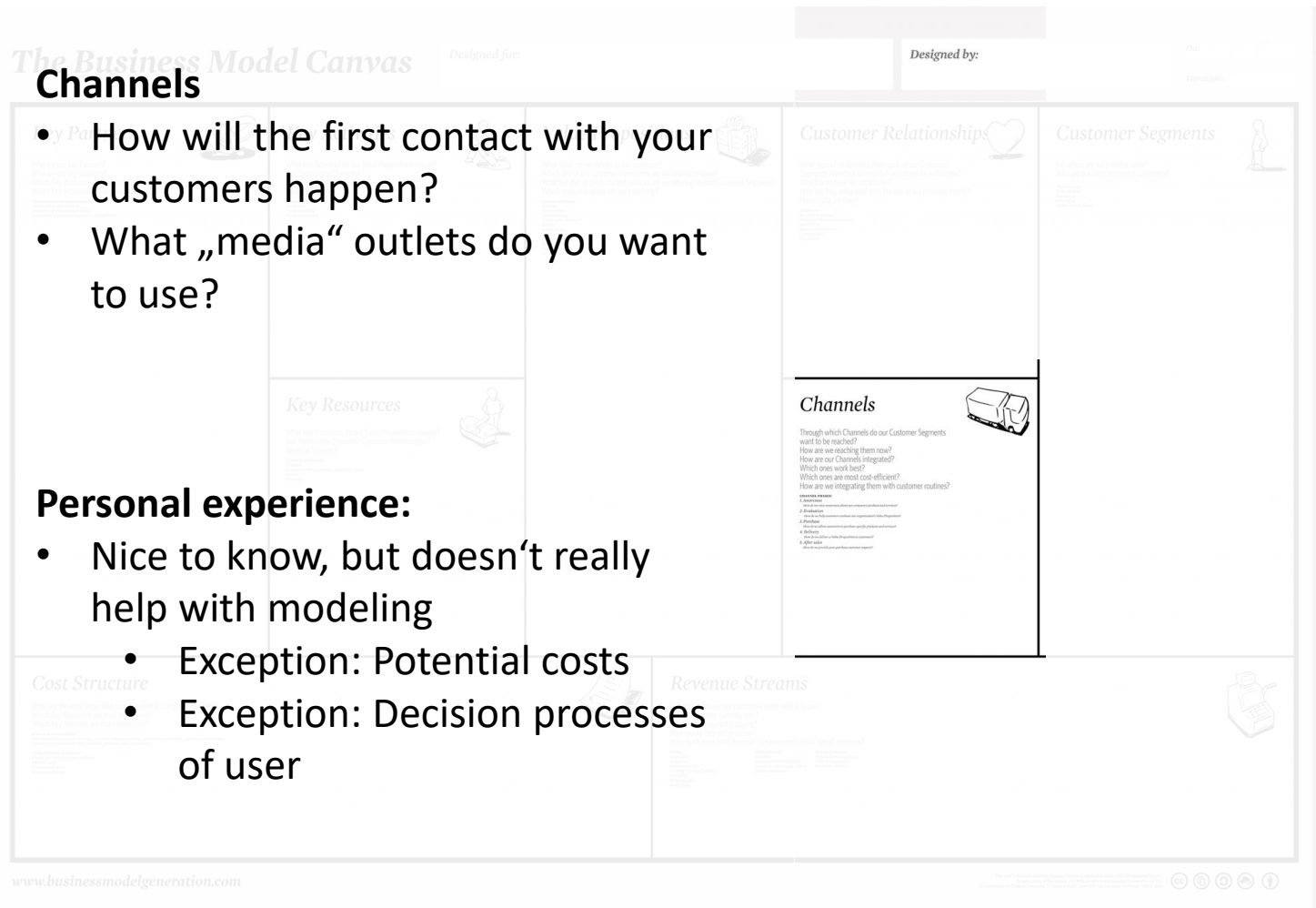
## The Business Model Canvas

### Channels

- How will the first contact with your customers happen?
- What „media“ outlets do you want to use?

### Personal experience:

- Nice to know, but doesn't really help with modeling
  - Exception: Potential costs
  - Exception: Decision processes of user



# Basics – The Business Model Canvas

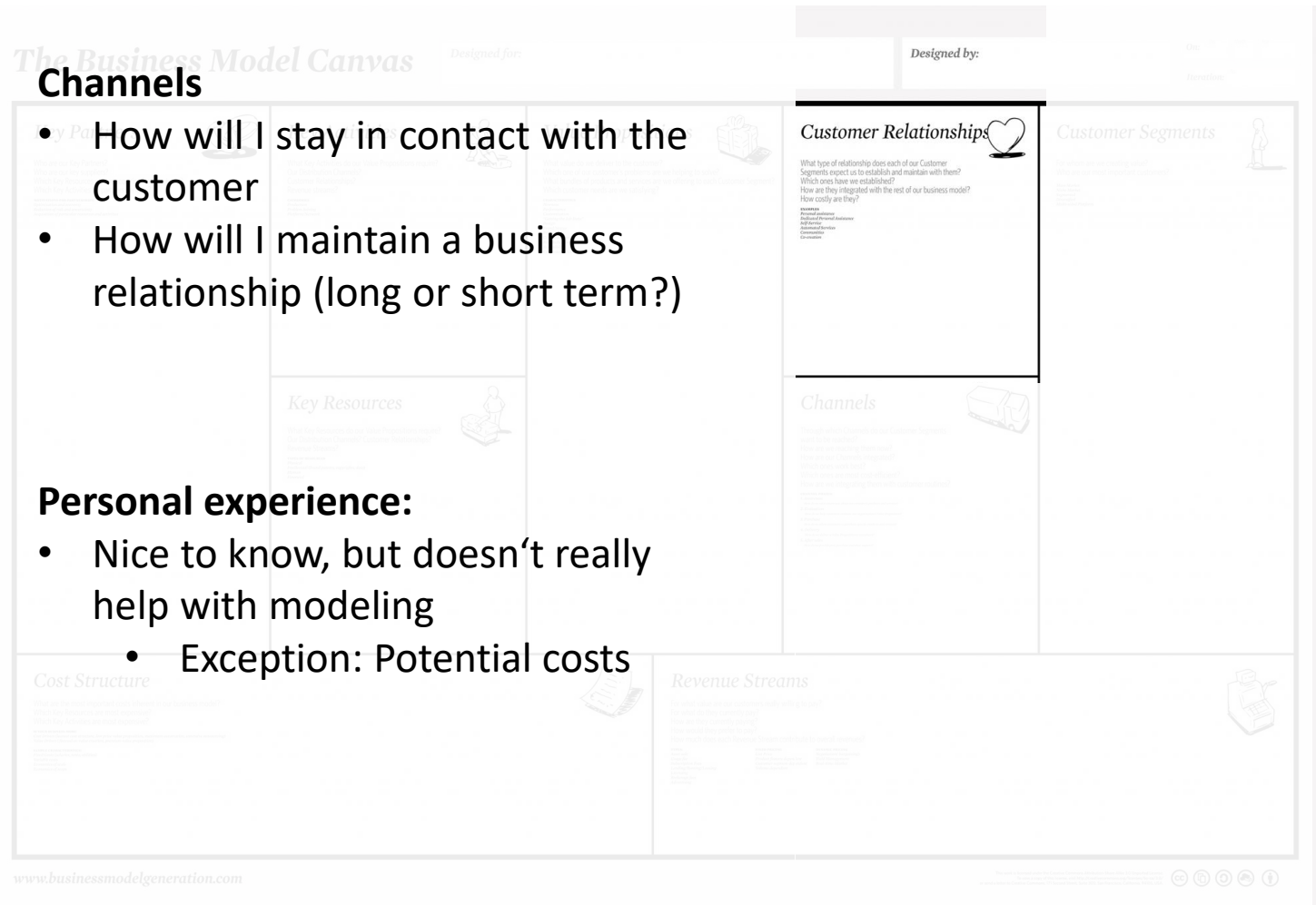
## The Business Model Canvas

### Channels

- How will I stay in contact with the customer
- How will I maintain a business relationship (long or short term?)

### Personal experience:

- Nice to know, but doesn't really help with modeling
  - Exception: Potential costs





# The Business Model Canvas

## The Business Model Canvas

Designed for:

Designed by:

Who:

Where:

### Key Partners

Who are the partners?  
Who are we relying upon?  
Which key resources are we sharing with partners?  
Which key activities can partners perform?



### Key Activities

What Key Activities do our Value Propositions require?  
Our Distribution Channels?  
Customer Relationships?  
Revenue streams?



### Key Resources

What Key Resources do our Value Propositions require?  
Our Distribution Channels?  
Customer Relationships?  
Revenue streams?



### Cost Structure

What are the most important cost drivers for our business model?  
Which Key Resources are most expensive?  
Which Key Partners are most important?

### Key activities

- What are the KEY activities you need to do in order to serve your customers?

### Personal experience:

- Valuable to understand the entirety of the system around the model
- Might influence financial aspects

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# The Business Model Canvas

## The Business Model Canvas

Designed for:

Designed by:

Date:

Version:

### Key Partners

Who are the partners?  
What resources do they provide?  
What activities do they perform?  
What value do they create?



### Key Activities

What key activities do we perform?  
What resources do we need?  
What value do we create?



### Key Resources

What key resources do we need?  
What resources do we have?  
What value do we create?



### Value Propositions

What value do we provide?  
What resources do we need?  
What value do we create?

## Key resources

- What are the key people, places, machines, patents, and intangible assets you need to use in order to succeed.

### Customer Relationships

What relationships do we need?  
What resources do we need?  
What value do we create?



### Customer Segments

What segments do we serve?  
What resources do we need?  
What value do we create?



### Channels

What channels do we use?  
What resources do we need?  
What value do we create?



### Cost Structure

What are the most important costs?  
What resources do we need?  
What value do we create?

## Personal experience:

- Valuable to understand the entirety of the value chain
- Might influence financial aspects (especially in sizing simulations)

### Revenue Streams

What revenue streams do we have?  
What resources do we need?  
What value do we create?



# The Business Model Canvas

## The Business Model Canvas

### Key Partners

Who are our Key Partners?  
Who are our key suppliers?  
Which Key Resources are we acquiring from partners?  
Which Key Activities do partners perform?



### Key Resources

What Key Resources do our Value Propositions require?  
Do they represent Customer Relationships?  
Channels? Infrastructure?  
Human Resources?  
Financial Resources?  
Technology?



### Key partners

- Who are the external partners that can make your life easier
- Which external partners (suppliers, etc.) are absolutely necessary
- What partner could help you when trying to outsource something

### Personal experience:

- Helps to understand the surrounding of the model

### Cost Structure

What are the most important costs involved in our Value Proposition?  
Which Key Resources are most expensive?  
Which Key Activities are most expensive?

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# The Business Model Canvas

## The Business Model Canvas

Designed for:

Designed by:

Who:

Where:

### Key Partners

Who are the best partners to help us develop our business model?  
Which Key Partners are most important to our business model?  
Which Key Partners can provide unique value?



### Key Activities

What Key Activities must we perform to make our business model work?  
Which Key Activities are most important to our business model?  
Which Key Activities can provide unique value?

### Key Resources

What Key Resources do we need to make our business model work?  
Which Key Resources are most important to our business model?  
Which Key Resources can provide unique value?



### Value Propositions

What value do we offer our customers?  
Which Value Propositions are most important to our business model?  
Which Value Propositions can provide unique value?

## Costs structure

- What are the most relevant cost factors?
- How are these factors influenced if sales go up or down?

### Relationships

What type of relationships do we need to make our business model work?  
Which Relationships are most important to our business model?  
Which Relationships can provide unique value?



### Customer Segments

Which Customer Segments are most important to our business model?  
Which Customer Segments can provide unique value?



### Channels

Which Channels are most important to our business model?  
Which Channels can provide unique value?



### Cost Structure

What are the most important costs inherent in our business model?  
Which Key Resources are most expensive?  
Which Key Activities are most expensive?

Fixed Costs: Salaries, rent, equipment, etc.  
Variable Costs: Materials, shipping, etc.  
Semi-variable Costs: Utilities, etc.

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## Personal experience:

- One of the key factors for techno-economic-models
- Consider not only the direct costs – but also aspects surrounding your simulation



### Revenue Streams

What revenue streams do we generate?  
Which Revenue Streams are most important to our business model?  
Which Revenue Streams can provide unique value?







# Any questions so far?



**WHY**

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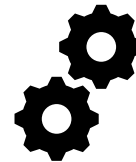


# An extended yet simple example

**Technical sizing of a PV on the roof of a house**  
Single household (H0 Standard Load-profile)  
wants to build a PV-generator.

Consideration of:

- investment cost
- Infeed yield
- Consumption Tarif



# How to consider business models?

## Direct approach:

- All economic parameters are considered directly within the simulation or optimisation model

## Personal experience:

- For simple business models
- No value chains consideration
- For simply economic evaluations (to investplanning for instance)
- When no depiction of the economic side is required

## Indirect approach:

- The most relevant economic parameters are considered directly in the simulation or optimisation model
- Detailed Economic evaluation will happen separately in another tool

## Personal experience:

- For complex business models or value chain consideration
- For full fledged economic evaluations (taxes, cash flows, etc.)
- When working with partners who the economic side separately

# Value Chains

## This is where things get complicated

- Business Model Canvas: Strong focus on one value proposal
- What happens if more businesses within the same „holding“ are involved?
- What happens if one business model has (a) negative effect(s) on other business models within the company?
- But provides another part of the company / holding with a new business possibility?

## Approach

- Depict the influences of the technology of the „holding“
- Highlight the connections and value flows





# Any questions so far?





# Thank you for your participation and attention!

► **4ward Energy** ►►

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