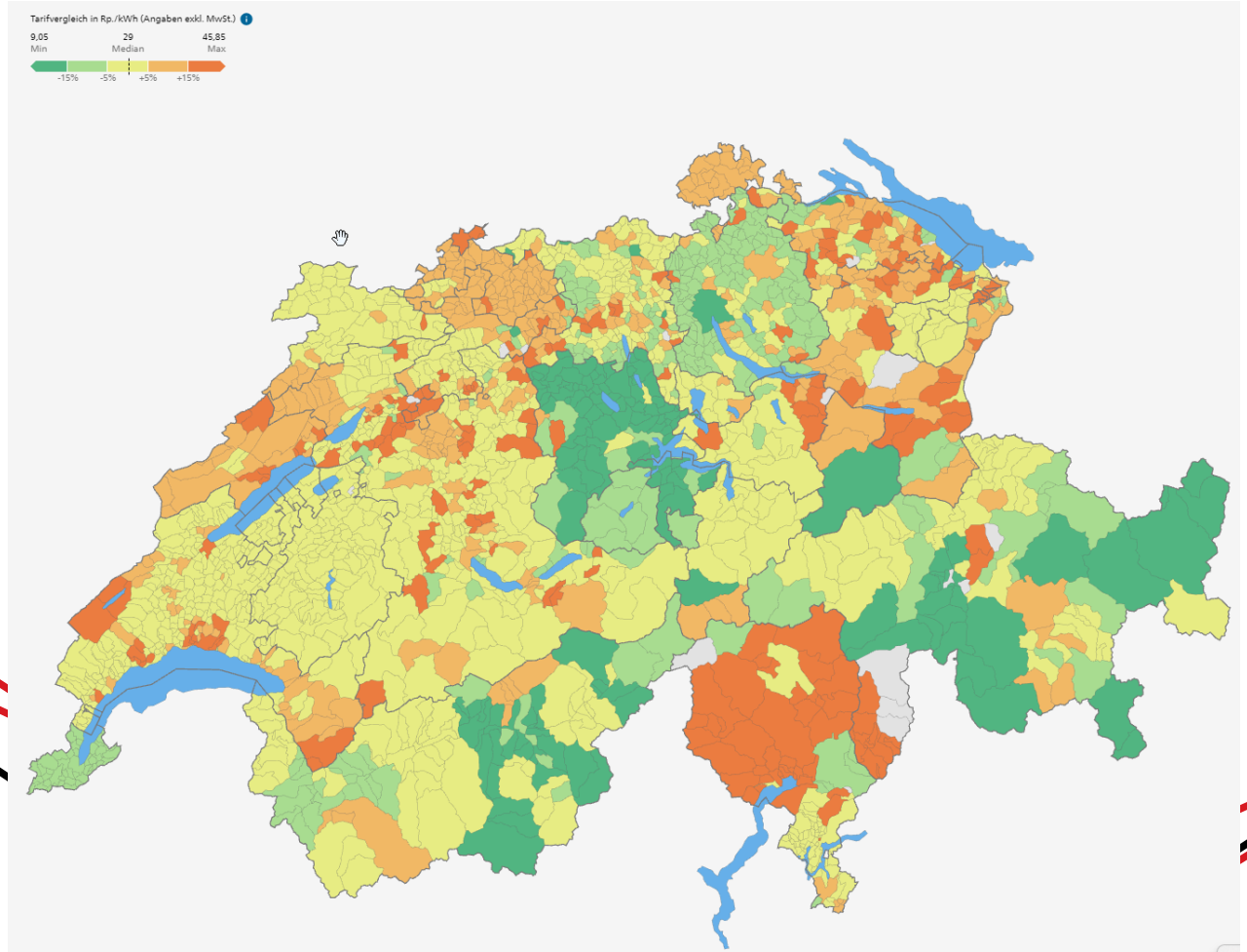
ENERGY DATA HACKDAYS

Watts & Bots: Energizing Swiss Tariff Transparency with AI

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What

Develop a **GenAI solution** using the **openAI API**, which can provide the end user with the **correct detailed electricity tariffs** of all individual products **of each electricity provider** (including the break-down of prices into the different components) for every municipality **in Switzerland.**

Michael Mazourik, Maurice Sifrig, Stefano Spadaccia, Giuseppe Caponetto, Patrick Ploesser, Mathias Niffeler, Lukas Mona, Angelos Selviaridis, Sushi Luo

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Challenges

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Energieprodukt	Hoch-tarif Rp./kWh	Nieder-tarif Rp./kWh		Netzprodukt	Einheits-tarif Rp./kWh		SDL Rp./kWh		Strom-reserve Rp./kWh		Förderung Energie-effizienz Rp./kWh		Bundes-abgaben Rp./kWh		Total Hoch-tarif Rp./kWh	Total Nieder-tarif Rp./kWh	Grund-tarif CHF/Mt.
Elektrizitätstarif für feste Endverbraucher																	
EKZ Mixstrom	20,54	18,92	+	**EKZ Netz 400F**	7,46	+	0,81	+	1,30	+	0,17	+	2,49	=	**32,77**	**31,15**	8.65
Elektrizitätstarif für feste Endverbraucher mit Wärmepumpe																	
EKZ Mixstrom	20,54	18,92	+	**EKZ Netz 400WP**	6,38	+	0,81	+	1,30	+	0,17	+	2,49	=	**31,69**	**30,07**	8.65







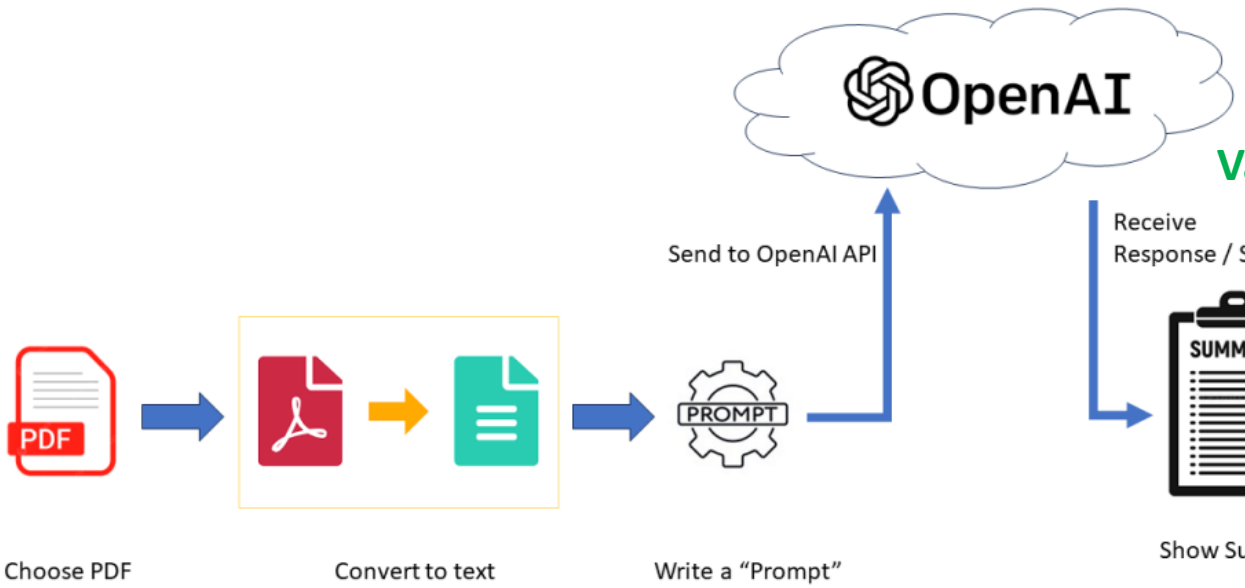


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How

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Pipeline already exists

or

Bring your own ideas



ENERGY DATA HACKDAYS

Started from this

Simple prompt

```
I am trying to harmonize and classify the data contained in the following PDF.
I want to convert this PDF so that it validates against the provided JSON schema. Please create the
JSON for me and make sure it is valid according to the schema. Please respond only with the JSON without any additional words.
```

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Complex JSON Schema


```
"Netzbetreiber": "AEW Energie AG",
"Produkte": [
    {
        "Name": "AEW Classic Naturstrom",
        "Beschreibung": "Strom für Privat- und Gewerbekunden",
        "Komponenten": [
            {
                "Name": "Energielieferung",
                "Beschreibung": "Arbeitspreise für Energielieferung",
                "Einheit": "Rp./kWh",
                "Unterkategorie": "Energie",
                "Menge": "22.35",
                "Tariftyp": "Einfachtarif",
                "Tarifzeiten": ""
            },
            {
                "Name": "Netznutzung",
                "Beschreibung": "Arbeitspreise für Netznutzung",
                "Einheit": "Rp./kWh",
                "Unterkategorie": "Netznutzung",
                "Menge": "9.70",
                "Tariftyp": "Einfachtarif",
                "Tarifzeiten": ""
            },
```

```
"Sommer": {
    "Montag-Freitag": {
        "Von 00:00 bis 01:00 in Rp./kWh": 39.46,
        "Von 01:00 bis 02:00 in Rp./kWh": 39.46,
        "Von 02:00 bis 03:00 in Rp./kWh": 39.46,
        "Von 03:00 bis 04:00 in Rp./kWh": 39.46,
        "Von 04:00 bis 05:00 in Rp./kWh": 39.46,
        "Von 05:00 bis 06:00 in Rp./kWh": 39.46,
        "Von 06:00 bis 07:00 in Rp./kWh": 39.46,
        "Von 07:00 bis 08:00 in Rp./kWh": 39.46,
        "Von 08:00 bis 09:00 in Rp./kWh": 39.46,
        "Von 09:00 bis 10:00 in Rp./kWh": 39.46,
        "Von 10:00 bis 11:00 in Rp./kWh": 39.46,
        "Von 11:00 bis 12:00 in Rp./kWh": 39.46,
        "Von 12:00 bis 13:00 in Rp./kWh": 39.46,
        "Von 13:00 bis 14:00 in Rp./kWh": 39.46,
        "Von 14:00 bis 15:00 in Rp./kWh": 39.46,
        "Von 15:00 bis 16:00 in Rp./kWh": 39.46,
        "Von 16:00 bis 17:00 in Rp./kWh": 39.46,
        "Von 17:00 bis 18:00 in Rp./kWh": 39.46,
        "Von 18:00 bis 19:00 in Rp./kWh": 39.46,
        "Von 19:00 bis 20:00 in Rp./kWh": 39.46,
        "Von 20:00 bis 21:00 in Rp./kWh": 39.46,
        "Von 21:00 bis 22:00 in Rp./kWh": 39.46,
        "Von 22:00 bis 23:00 in Rp./kWh": 39.46,
        "Von 23:00 bis 00:00 in Rp./kWh": 39.46
```

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Moved to this

Detailed prompt explaining to ChatGPT how the products are structured

```
I am trying to harmonize and classify the data contained in the following PDF.
I want to convert this PDF so that it validates against the provided JSON schema. Please create the
JSON for me and make sure it is valid according to the schema. Please respond only with the JSON without any additional words.

In the JSON schema when you see something like "Menge", please fill this field with a string containing the amount of the "Einhe

A pdf file with electricity tariffs of Swiss DSO is provided. Electricity tariffs are structured as follows:
a) there ist a certain number of products
b) for each product, the price is split into various components: there is a price for the Energy (Energie), one for the grid (Ne
more additional taxes (Abgaben)
c) the energy price is sometimes split into a high tariff (Hochtarif) and a low tariff (Niedertarif oder Normaltarif) which depe

I want to convert this PDF to a structured json file so that it validates against the provided JSON schema.
Please create the JSON for me and make sure it is valid according to the schema.
Please respond only with the JSON without any additional words.

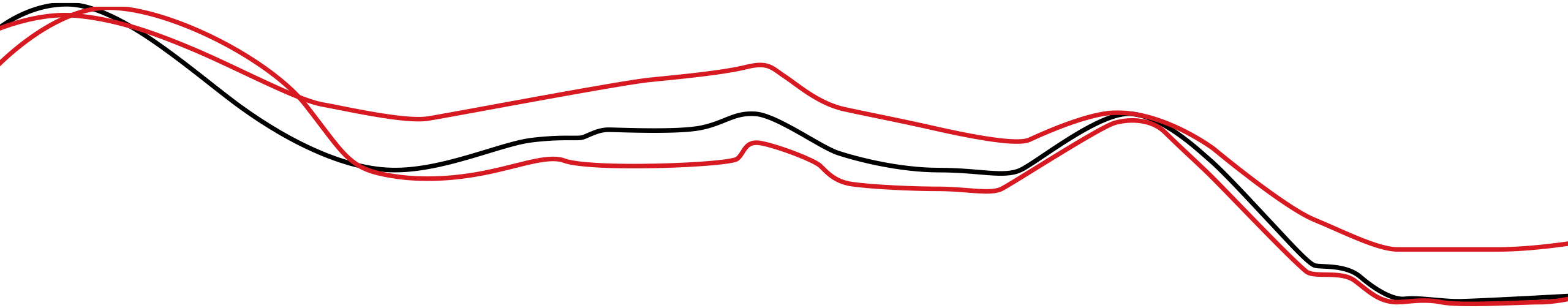
In the JSON schema when you see something like "Von 00:00 bis 01:00 in Rp./kWh" we would like to Fill this field with the price
in that day and hour of the day. If there is nothing specified (no matter if Summer or Winter) please use the standard tariff as
this field should never be zero.

It is important to analyse the structure of the tariff sheet before extracting the data:
Some DSOs present the products as rows and the price components as columns. Others present the products as
the columns and the components as rows.
```

Simplified JSON Schema

Automatic validation pipeline run

- Some statistics out of the analysis: retrieved non-zero prices: 94 / 125 (75%)
- retrieved non-zero hourly/weekly/seasonal tables: 42 /125 (33.5%)
- number of results in agreement with Elcom: 0 / 125 (0%)



Frontend JSON Visualizer for visual overview / validation

Electricity Tariffs

Filter by Product:

All Products

Filter by Offer:

All Offers

Topaze - SID SIMPLE

L'électricité composée de solaire local Suisse, d'hydraulique Suisse

Tariffs:

Fixed Tariff: 26.24 cts/kWh (without VAT), 28.32 cts/kWh (with VAT)

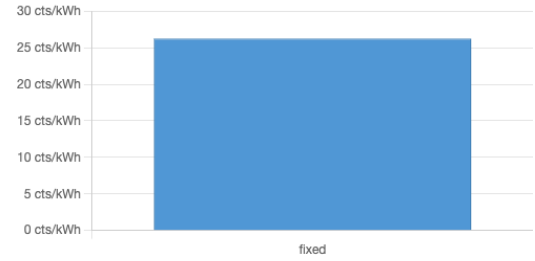
Schedule:

Fixed rate from 0:00 to 24:00

24-Hour Schedule:



Low Tariff High Tariff Fixed Tariff



Topaze - SID DOUBLE

L'électricité composée de solaire local Suisse, d'hydraulique Suisse

Tariffs:

High Tariff: 28.72 cts/kWh (without VAT), 31.00 cts/kWh (with VAT)

Low Tariff: 21.56 cts/kWh (without VAT), 23.26 cts/kWh (with VAT)

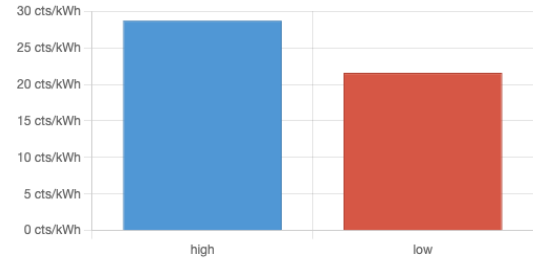
Schedule:

Low rate from 0:00 to 7:00 , High rate from 7:00 to 21:00 , Low rate from 21:00 to 24:00

24-Hour Schedule:



Low Tariff High Tariff Fixed Tariff



ENERGY DATA HACKDAYS

Learnings

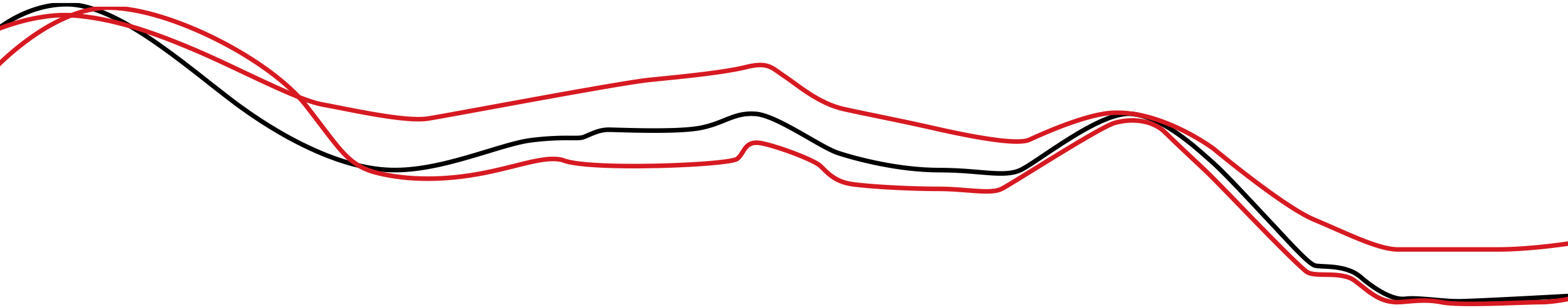
- The different PDF structures are very difficult to standardize
- More effort needs to be put into prompt engineering
  - Explain the different possible offerings and products as good as possible – convey domain knowledge
  - “Teach” ChatGPT the terminology and the different synonyms / specifics of the products
- There needs to be balance between abstraction and precision for the schema, so that it can handle as many different cases as possible in the best possible way

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Future possibilities / potentials

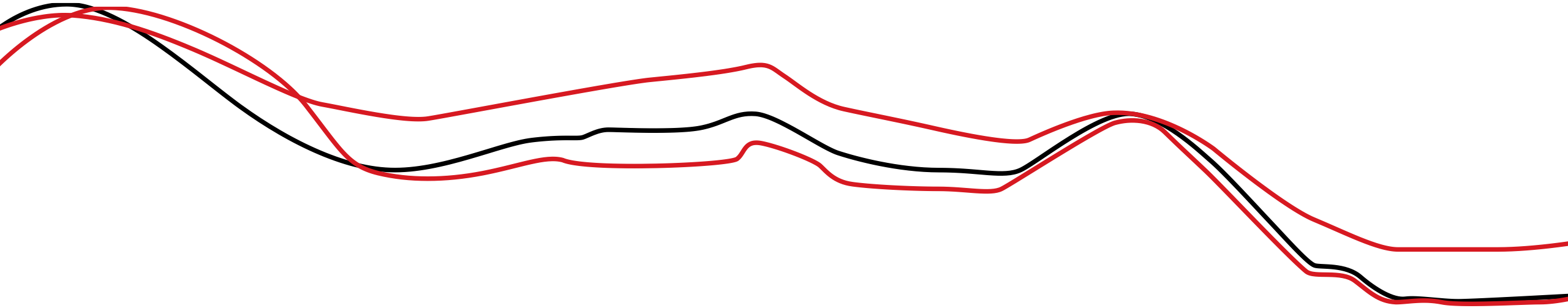
- Increase the Iterations with AI
- Try few-shot learning (provide examples)
- Optimize the schema according to the balance abstraction / precision
- Standardisation of the «Tarifblätter»
- Try with a RAG based approach (Tariff-GPT)



Future possibilities / potentials

OR…

SOMEONE PLEASE publish the original data in a structured way!!!



ENERGY DATA HACKDAYS

Live Demo

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