IRIS

Integrated and Replicable Solutions for Co-Creation in Sustainable Cities

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# Deliverable 5.6

## Launch of T.T. #4 activities on CIP and information services

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|---|---|
| **Work Package:** | WP5: Utrecht Lighthouse City demonstration activities |
| **Task:** | T5.6: Demonstrating Transition Track #4: City Innovation Platform (CIP) and information services |
| **Lead Beneficiary:** | UTR |
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## Disclaimer

# EXECUTIVE SUMMARY

Objective of this deliverable is to provide a detailed overview of the activities for Transition Track #4 within the Utrecht demonstration. The Grand Agreement states the objective as: "Through cross-cutting open ICT (1) enable the integration of the IRIS solutions, maximising cost-effectiveness of the integrated infrastructure, (2) provide the City Innovation Platform (CIP) and (3) develop meaningful information services for households, municipality and other stakeholders, (4) together allowing for new business models." The document is aimed at giving insight into de progress made on the diverse data services developed within the IRIS project in the demonstration area Kanaleneiland-Zuid in Utrecht. It helps other lighthouse cities and following cities within the IRIS project to see and learn what possibilities for services are and how they can be replicated.

The activities in the first 24 months included further detailing and defining the data services, developing a common process for the development of the services, making a clear division of roles in the process, discussing/establishing the cooperation/link with activities in WP 3 and WP4 and appointing a data challenger for each of the measures. Within TT#4 the following services are being developed:

- Measure 1: Monitoring E-Mobility with LoRa network
- Measure 2: Smart Street Lighting with multi-sensoring
- Measure 3: 3D Utrecht City Innovation Model
- Measure 4: Monitoring Grid Flexibility
- Measure 5: Fighting Energy Poverty

Integration of the IRIS solutions

The IRIS proposal distinguishes 4 Integrated Solutions (IS) in TT4:

1 Services for Urban Monitoring: Two types of services are integrated into the CIP: multi-sensoring in smart lamp posts and tracking use and misuse of EV-parking bays
2 Services for City Management and Planning: 3D City modelling in combination Energy Data Services are used to engage citizens and which can be used by urban planners to design the city
3 Services for Mobility: Different datasets are integrated to track at city level use of different e-mobility solutions like WeDriveSolar-cars and electric buses
4 Services for Grid Flexibility: The USEF and Gopacs Framework will be demonstrated as a means to optimize grid flexibility, characterized by smart management of PV-panels, stationary battery storage and V2G-EV-carbatteries and possibly hybrid heat pumps.

Maximising cost-effectiveness of the integrated infrastructure

The cost-effectiveness of integrated infrastructure is most noticeable in the Services for Grid Flexibility witch are aimed at developing The potential of flex services is reducing effect on peak loads in the grid and in the future avoiding heavy grid investments, optimization of the use of local renewable energy and thereby reduce climate impact. Other cost effective integrated solutions are the monitoring of E-Mobility leading to a more efficient use of charging infrastructure and the Smart Street Lighting leading to a more efficient and energy saving use of street lighting.

City Innovation Platform (CIP)

The CIP is a data platform that can host different static an dynamic data sets through witch integrated data services can be developed. CIP is used for the measures 1, 2, 3 and 5 connecting different data

streams and thereby enabling new information services. Different data connections have been established (charge point data, parking sensor data, energy usage data) other connections need to be established in the near future (TOON data, cabal capacity data, shared car data).

Meaningful information services

With the available data on the CIP meaningful information services for households, municipality and other stakeholders can be developed. The developed services are:

- Information policy service for e-mobility: issuing traffic rules for reserving charging bays;
- Connectivity and sensor services on street lighting (telecom services, light services, air pollution sensoring)
- The app "Mijn Woonwijk" was developed. The app is aimed at increasing the involvement of citizens in the changes and new projects in their neighbourhood. The app was developed and tested among a limited number of users.
- A market place and a data network is being developed for managing local grid flexibility.

New business models

A few new business models have been discovered. So far only measure 4 has a clear value model for new business. WeDriveSolar is developing a flexibility service based on stationary battery, the shared V2G cars and the installed solar with a profitable return on investment. The business model for multi-sensoring on the street lighting does not look promising, but the 5G connection services has serious potential value. Challenging is how to market this value. The XR/3D model might be promising to market towards civil services and governmental organisations. The possible smart energy service for fighting energy poverty can have strong social impact, but might be interesting for other commercial markets.

Table 1: measures in a nutshell

| Demonstrator | In a nutshell |
|---|---|
| Measure 1: Monitoring E-Mobility with LoRa network | Brief summary: So far the pilot is developing successfully. Cooperation between involved IRIS project partners Municipality of Utrecht, WeDriveSolar and Civity is established, leading to task and budget assignment and planning. Also procurement of equipment (parking sensors) and cooperation with Communithings is established. The first sensors are put into place and monitoring starts further conclusions can be drawn. |
| | Expected impact: A data service will contribute to a more efficient use of the charging infrastructure in Utrecht and beyond. Thereby contributing to lowering the costs for charging infrastructure and optimizing charging services for e-drivers. |
| | Deviation to GA: no deviations |
| Measure 2: Smart Street Lighting with multi-sensoring | Brief summary: In two co-creation workshops functional specifications for a smart pedestrian crossing have been set. Technical specification of the crossing and lamp-post has been done. Early 2020 the smart street lighting and the crossing will be put into place. A second track has been opened in this measure. The municipality of Utrecht is currently facing the procurement for replacement of 60.000 lamp posts within the city. A tender will be put into the market. The municipality of Utrecht wants sensor and connectivity services to be a part of this procurement. The city aims at deriving lessons from the IRIS project to put a successful tender into the market for the 60.000 lampposts. |
| | Expected impact: Data collected through these sensors should be used to enhance data driven district policies aimed at reducing/minimizing problems faced by the |

| Demonstrator | In a nutshell |
|---|---|
| | citizens in public space. Future connectivity services promise a new business model for the operation of street lighting |
| | Deviation to GA: no deviations |
| Measure 3: 3D Utrecht City Innovation Model | Brief summary: A '3D City Information Model application' for the Kanaleneiland district in Utrecht has been developed. This model is a data-based 3D representation of the district and provides insight into the energy performance in Kanaleneiland. The app "Mijn Woonwijk" was developed. The app is aimed at increasing the involvement of citizens in the changes and new projects in their neighbourhood. The app was developed and tested among a limited number of users. |
| | Expected impact: 3D visualization that potentially can support integrated city planning and promote the involvement of citizens. Experience shows that participation leads to better projects, better considerations and decision-making and more support for finally selected solutions. |
| | Deviation to GA: development on the 3D model has been slower than expected. The development of a new Urban Planning Vision for de city district and a Living Lab "Omgevingsvisie" bring an opportunity for the further development of the 3D City Model within a participative planning development. |
| Measure 4: Monitoring Grid Flexibility | Brief summary: For the implementation of Grid Flexibility Services the assets need to be installed. The energy storage battery will be installed Q1 2020 meaning services will start summer 2020. Progress so far has been implementing the necessary data connections. |
| | Expected impact: The potential of flex services is reducing effect on peak loads in the grid and in the future avoiding heavy grid investments, optimization of the use of local renewable energy and thereby reduce climate impact. |
| | Deviation to GA: the battery and PV-solar installation (TT1) have been delayed. Energy data services are dependent on the hardware instalment. This will be finished end of Q1/beginning of Q2 in 2020. Then smart energy data services will be implemented based upon the congestion management. |
| Measure 5: Fighting Energy Poverty | Brief summary: A challenge/tender for Energy Poverty Services has been put into market. The challenge didn't deliver a satisfying solution. A different approach using the smart in home energy manager TOON (TT1) will be developed together with Eneco. |
| | Expected impact: The objective is to develop a data service for tenants of housing corporation Bo-Ex, which gives them control over and/or better understanding of their energy bills, resulting in reduced energy bills and increased disposable income of tenants. |
| | Deviation to GA: no deviations |

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# List of Abbreviations and Acronyms

| Abbreviation | Definition |
|---|---|
| CIP | City Innovation Platform |
| DoA | Description of Action |
| EU | European Union |
| FC | Follower City |
| IS | IRIS Solution |
| KPI | Key Performance Indicator |
| LH | Lighthouse |
| LHCSM | Lighthouse City Site Manager |
| MaaS | Mobility as a Service |
| OCPI | Open Charge Point Interface protocol |
| PoR | Programme of Requirements |
| PV | Photovoltaic |
| RES | Renewable Energy Sources |
| TT | Transition Track(s) |
| WP | Work Package |

# 1 Introduction

## 1.1 Scope, objectives and expected impact

Objective of this deliverable is to provide a detailed overview of the activities for Transition Track #4 within the Utrecht demonstration. The deliverable is aimed at giving insight into de progress made on the diverse data services developed within the IRIS project in the demonstration area Kanaleneiland-Zuid in Utrecht. It helps other lighthouse cities and following cities within the IRIS project to see and learn what possibilities for services are and how they can be replicated. Within TT#4 the following services are being developed:

- Measure 1: Monitoring E-Mobility with LoRa network
- Measure 2: Smart Street Lighting with multi-sensoring
- Measure 3: 3D Utrecht City Innovation Model
- Measure 4: Monitoring Grid Flexibility
- Measure 5: Fighting Energy Poverty

## 1.2 Contributions of partners

Key partners in TT#4 are listed below, next to these partners several other partner are involved for the individual data service.

| | |
|---|---|
| Municipality of Utrecht | TT#4 lead and data service challenger |
| We Drive Solar | Data service challenger |
| Bo-Ex | Data service challenger |
| Stedin | Data service challenger |
| Utrecht University | Data service manager. |
| Civity | Data service reviewer |

## 1.3 Relation to other activities

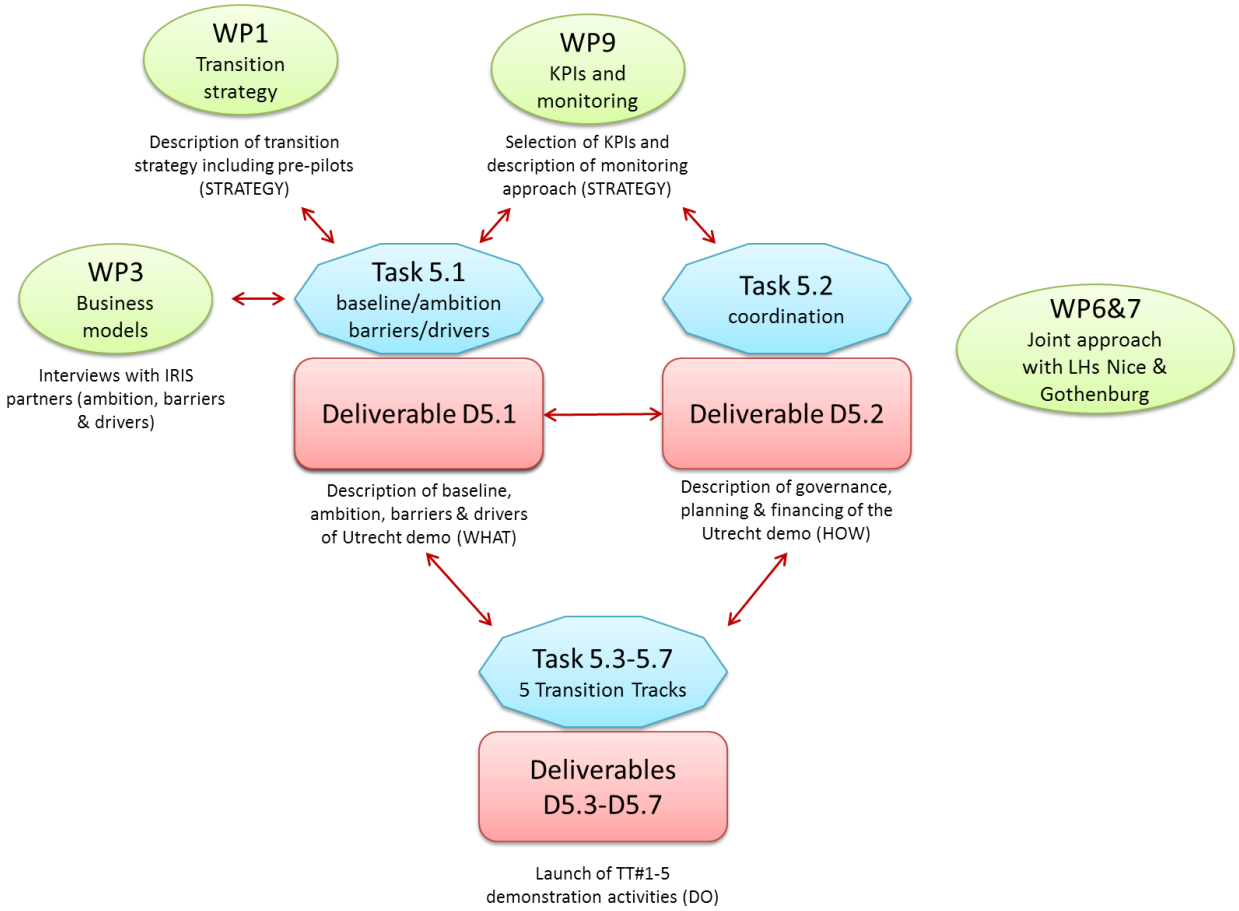


*Figure 1 Relation of Deliverable D5.6 to other activities in the IRIS project*

## 1.4 Structure of this deliverable

This document contains the overall starting points for TT#4 activities, which include a description of the demonstration in a nutshell, the baseline for TT#4 and the organisation of work. From chapter 5, the five measurements within TT#4 are explained and the results achieved until month 24 reported. Chapter 12 contains the ethical requirements we've to deal with, when rolling out the activities and monitoring. The last two chapters hold the output to the other Work Packages as well as a conclusion and next steps.

# 2 Demonstration in a nutshell

## 2.1 Ambitions for TT#4

The *DoA states* that Utrecht has the ambition, through cross-cutting open ICT to enable:

(a) the integration of the IRIS solutions, maximising cost-effectiveness of the integrated infrastructure. Next, open ICT-systems, open application program interfaces (APIs) and standards provide
(b) the City Innovation Platform and
(c) meaningful information services for households, municipality and other stakeholders,
(d) together allowing for new business models.

The objective is to develop services linked to the measures listed in Table 2.

*Table 2 Ambitions TT#4 laid down in the Grant Agreement*

| Services linked to: | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Measure 1: Monitoring E-Mobility with LoRa network | specification | co-creation | demo | demo | demo |
| Measure 2: Smart Street Lighting with multi-sensoring | specification | co-creation | demo | demo | demo |
| Measure 3: 3D Utrecht City Innovation Model | specification | co-creation | demo | demo | demo |
| Measure 4: Monitoring Grid Flexibility | specification | co-creation | demo | demo | demo |
| Measure 5: Fighting Energy Poverty | specification | co-creation | demo | demo | demo |

Data services are following on the development of the measures in other WPs. This dependency makes that some of the services have had less progress than was hoped for. Table 3 presents an updated overview of the ambitions.

*Table 3 Updated ambitions overview*

| Services linked to: | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Measure 1: Monitoring E-Mobility with LoRa network | specification | co-creation | implementation | demo | demo |
| Measure 2: Smart Street Lighting with multi-sensoring | specification | co-creation | co-creation specification | demo | demo |
| Measure 3: 3D Utrecht City Innovation Model | specification | co-creation | development | demo | demo |
| Measure 4: Monitoring Grid Flexibility | specification | co-creation | development | demo | demo |
| Measure 5: Fighting Energy Poverty | specification | co-creation | co-creation | demo | demo |

## 2.2 Demonstration area

The demonstration area for *all 5 transition tracks* is situated in the district of Kanaleneiland-Zuid in the city of Utrecht and the neighbouring area Westraven. This is a residential area of 64 hectares situated in the Utrecht Centre-West area, just southwest of the historic city centre and the Utrecht Central Station. Two large canals (hence 'canal island') surround the district, one of which is used intensively for freight transport (Amsterdam-Rhine Canal). Development of the data-services is not strictly limited to this demonstration area.

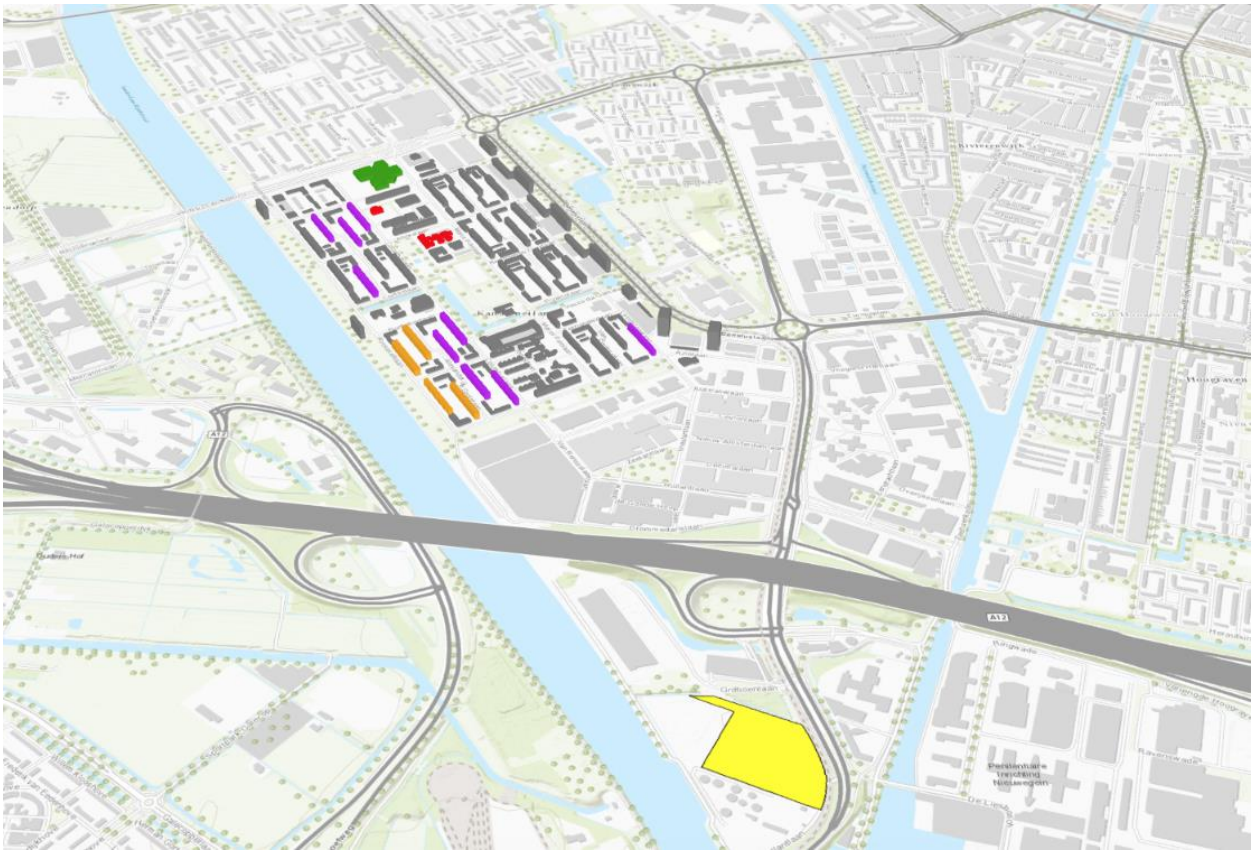

*Figure 2 Location of the demonstration district Kanaleneiland Zuid and Westraven (yellow hatched).*

*Source: Utrecht op de Kaart* [http://kaartenutrecht-gemu.opendata.arcgis.com/](http://kaartenutrecht-gemu.opendata.arcgis.com/)

## 2.3 Integrated Solutions in TT#4

The IRIS proposal distinguishes 4 Integrated Solutions (IS) in TT4:

- IS4-1: Services for Urban Monitoring
- IS4-2: Services for City Management and Planning
- IS4-3: Services for Mobility
- IS4-4: Services for Grid Flexibility.

In IS4-1 two types of services are integrated into the CIP: multisensoring in smart lamp posts and tracking use and misuse of EV-parking bays.

In IS4-2 3D City modelling in combination Energy Data Services are used to engage citizens and which can be used by urban planners to design the city.

In IS4-3 different datasets are integrated to track at city level use of different e-mobility solutions like WeDriveSolar-cars, electric buses and possibly e-bikes.

In IS4-4 the USEF and GoPacs Framework will be demonstrated as a means to optimize grid flexibility, characterized by smart management of PV-panels, stationary battery storage and V2G-EV-carbatteries and possibly hybrid heat pumps.

Figure 3 shows how the development of the data-services in linked with the demonstrator in transitions track 1, 2 and 3, and the citizen engagement activities in transition track #4. The figure reveals that the development of the data services is an integral part of the Utrecht demonstration.

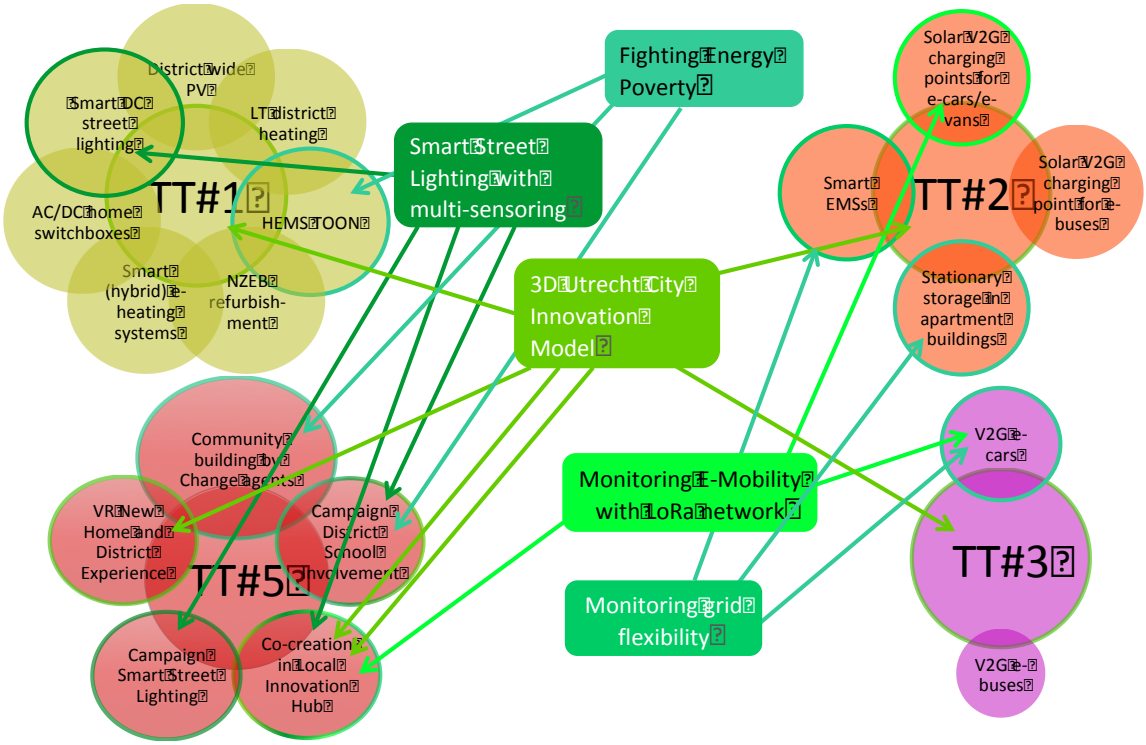


*Figure 3 Linkage between data-services (green boxes) and demonstrators in Transition Track 1, 2 and 3, and the link with the citizen engagement activities (Transition Track #5)*

## 2.4 Deviations according to the Grant Agreement

- Measures 1: delay in time caused by slower progress in the development of the data-connections needed. Demonstration will start early 2020.
- Measure 2: delay in time
- Measure 3: development on the 3D model has been slower than expected. The development of a new Urban Planning Vision for de city district and a Living Lab “Omgevingsvisie” bring an opportunity for the further development of the 3D City Model within a participative planning development.

- Measure 4: the battery and PV-solar installation (TT1) has been delayed. Energy data services are dependent on the hardware instalment. This caused a delay on the implementation of the services. This installation will be finished Q1 or Q2. Implentation of energy services are planned in Q3.
- Measure 5: A challenge for Energy Poverty Services has been put into market. The challenge didn't deliver a satisfying solution. Together with Eneco, the municipality and the EnergieBox a different approach using the smart in home energy manager TOON (TT1) will be developed.

# 3 Baseline / Drives and Barriers for TT#4

## 3.1 Baseline

The City of Utrecht has worked on an open data strategy since 2015. The strategy is based on actively involving city partners with open data needs. Utrecht collects and shares urban data by means of an open ICT urban data platform (utrecht.dataplatform.nl), offering more than 500 data sets and data services for policy development and urban planning processes. Utrecht also shares real time data on its data platform, for example about the availability of parking bays for disabled people.

## 3.2 Drivers and Barriers

*Drivers*

- The demand for data and information services has been on the rise in recent years. This demand is driven forward by the development of IoT-technologies, energy en mobility transitions, new data connection services (5G) and data driven policy development.
- These developments drive the implementation of an array of sensors, data streams, and connectivity devices in and around public space.
- When these data streams, connectivity services and sensors can be connected, they provide a fertile ecosystem for new meaningful information and data services for households, municipality and other stakeholders, together allowing for new business models.

*Barriers*

- Connecting the dots: until now data and sensor services have been singly developed. For developing additional data services with added value integration of data streams is needed. The current open urban data platform contains mainly static databases. For meaningful services real time or nearly real time data must be shared in a safe, accessible and reliable manner.
- Legal barriers: GDPR compliance sometimes is believed to complicate data exchange needed for new data services. Also issues on data ownership and regulating data accessibility in a just and legal manner can be complex.
- Organisational barriers: The City Innovation Platform can overcome many barriers. Bur especially in earlier development stages of the product it is difficult convincing data owners to put data into CIP as advantages of the CIP only become more apparent when more data sources are added.
- Technical barriers: Different data suppliers use many different data formats and data protocols. For fluent data exchange market data standards and protocols are needed. In some cases these standards are available and need to be implemented in the CIP.

# 4 Organisation of work

As a large number of partners in the Utrecht lighthouse city is involved in the development of the data-services, we defined a clear process for the further definition and development of the data-services and defined roles in the development process. The format for the development process for each of the data-services is outline below and includes four major steps (see Figure 4).

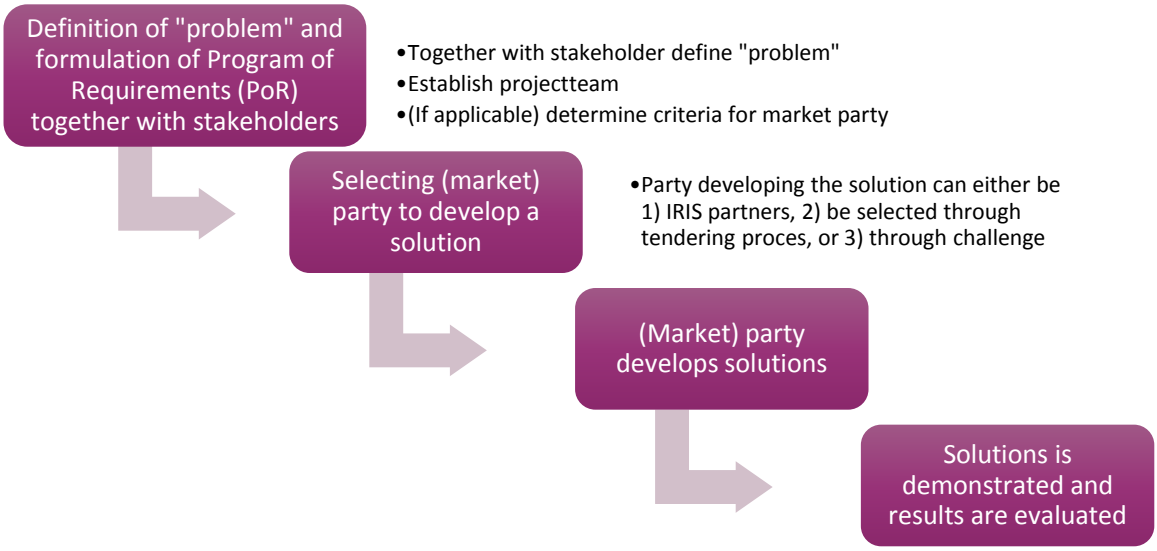


*Figure 4 Outline for the process for the development of data-services*

We furthermore defined the following roles in the development process:

- Data service challenger. This is the party that ultimately contracts the service. This does not have to be the user or end user, e.g. in case the citizen is the end user.
- Data service manager. This is the person responsible for coordinating the establishment of all data services within IRIS. That includes: Ensuring that the challenger for his use-case details the requirements sufficiently in the PoR, setting out the challenge so that possible providers within or outside the IRIS ecosystem can submit an offer, secure selection provider, etc.
- Data service reviewer. Person responsible for guaranteeing development of services connected to the CIP.

Key partners in TT#4 are listed below, next to these partners several other partner are involved for the individual data service. These partners are listed in the separate chapters on the data-services in the next chapters.

| | |
|---|---|
| Municipality of Utrecht | TT#4 lead and data service challenger |
| WeDriveSolar | Data service challenger |
| Bo-Ex | Data service challenger |
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| Utrecht University | Data service manager. |
| Civity | Data service reviewer |

# 5 Measure#1: Monitoring E-Mobility with LoRa network

## 5.1 Specifications

Deploying and operating EV charging bays is a substantial investment, which requires the most optimal and efficient use for a feasible business case. In the current situation it is not possible to provide EV-car users and charging pole operators with information about rightful or illegal usage of the parking bay. The aim for this *use case* within the IRIS-project is to create insight in the (in-efficient) usage of parking bays and charging infrastructure. This insight is useful for several stakeholders:

- *EV-car users*: EV drivers want to be able to make use of an EV charging pole without being confronted with real life situations as arriving at a charging bay, which was indicated to be free on a route planner and/or mobile app, but is in reality occupied by another car that is not using the charging pole.
- *Municipality*: The municipality has to make a traffic rule for every charge pole installed on a public parking bay to reserve the parking bay for charging. It takes about 4 months to implement the rule and the cost of each rule are € 300,- to € 400,-. About 2.500 new public chargers will be put into place over the next 5 years. The municipality wants to investigate if chargers can be put into place without the traffic rule. By measuring how often false occupation by a non-charging car is at hand a traffic rule can be implemented after installation during exploitation of the charger. The city's estimate is that only in 10% of the cases a traffic rule is actually needed.
- *EV charging pole operators*: The business of the EV charging infrastructure providers is generating revenue from providing electricity for charging. They are looking for maximum use of their infrastructure (note: this is the current dominant business model. In case of V2G charging additional revenues will be generated by delivering and storing electricity in the battery of the electrical vehicle to balance the grid, i.e. providing flexibility to the grid).
- *Enforcement & surveillance officers*: Enforcement & surveillance officers of the municipality are responsible for enforcement of the municipal traffic decision for parking bays reserved for EV. Under this decision enforcement officers have the authority to fine users of the parking bay that are not connected to the charging pole.


*Figure 5 EV charging pole in Utrecht and the traffic sign for charging*

*Monitoring rightful use of the Charging Bay*:

A sensor will be placed in the parking bay to measure usage. By combining the data from the parking sensor with the data from the charging pole an information service emerges, monitoring the rightful use of the charging bay. The municipality of Utrecht and the Charge Point Operator wish to better understand the problem of inefficient use of the parking bay. This service allows identifying and quantifying inefficient use of the parking bays when the charging bay is occupied but there is no connection with the EV charging infrastructure. The aim is to investigate if the city can put public chargers into place without making a specific traffic rule for each charging bay by monitoring false usage. This potentially safes investments in time and money for taking 2.500 traffic rules and still have efficient usage of the chargers.

Potential other services include

- *Law enforcement:* When a traffic rule is implemented, the sensor data can be used for informing officers about a vehicle using the parking space without a charging activity that took or has taken place. This service is aimed at avoiding fossil fuelled cars using the parking bays, or EV's parking without connection to the charging pole or no ongoing charging for a configurable time.
- *Authentication*: authentication of the user with the parking sensor to check for eligible use of the parking/charging facility. Non-eligible use can also trigger the officer for control and/or fine.
- *Maximum charging durations*: users and officers are informed when the maximum charging duration is reached, and the maximum duration is exceeded. This has been requested by enterprises lately to ensure that with the limited amount of charging poles on their premises, multiple vehicles from employees can recharge during the day (and not a single vehicle occupying the space for the full day). Obviously, this could also apply to "on-street" scenario.
- *Special parking tariffs*: tariffs apply for charging, but once charging is completed a "parking fee" kicks in. Through the City Innovation Platform data can be provided on duration of the parking session, so the EV charging provider can charge for the electricity charging as well as for the parking fee (entire parking duration, or parking duration minus charging time)

Note that this is a list of potential services, which does not imply that these will be developed. It shows the opportunities of combining data for the development of new services.

### 5.1.1 Technical specifications (hardware & software)

*Parking Sensors:*

The LoRaWAN in-ground parking sensor is equipped with triple detection technology - magnetic, ultrasound and infrared detection – in order to increase the accuracy. The sensor is equipped with a replaceable battery (note, other suppliers require replacing the entire sensor including electronics).

Speed of detection: The sensor performs measurements with a frequency of every 0,5 seconds. The parking sensor therefore detects a quick vehicle rotation, namely a car leaving (car1) and another car (car2) entering the parking bay within 5 seconds. This is important to ensure car 2 is not charged for parking duration of car 1.


*Figure 6 LoRa Parking Sensor*

*Charging poles*

The charging poles used are the public chargers put into place by consortium partner WeDriveSolar. The specification requirements are specified by the PoR of the municipal concession for public chargers. For data processing the OCPI standard is implemented.


*Figure 7 WeDriveSolar public charger in Utrecht*

*Data information services*

Using the City Innovation Platform (CIP) the data from the sensors and the connection status is combined. To integrate the sensor data into CIP a specific API is developed by IRIS project partner Civity. To integrate connection data into the CIP the standard protocol OCPI is used. This allows the CIP to obtain data not only from the charging poles used in the IRIS project but also from all available public chargers in The Netherlands enabling many other services.

Within this project data analysis will be done using Excel or similar software. When other services are developed a dashboard might a useful add-on.

### 5.1.2 Procurement of equipment and/or services

*Parking Sensors*

In total 40 parking sensors were purchased from Communithings. They were selected because they have experience in Utrecht with placement of parking sensors (50 similar parking sensors were placed at parking bays for disabled parking bays). Total costs for these parking sensors are € 10.000 and a service fee of € 250 per month. The sensors are co-funded by the Electric Mobility program of the municipality of Utrecht.

*Charge Poles*

The chargers are procured by the cities CPO WeDriveSolar and placed within the concession for the operation of public chargers within Utrecht's public space.

*Data information services*

The data is gathered in the CIP by IRIS project partner Civity. The initial information service is collecting the data real time and report the different statuses of the (mis)usage of the charging bays each month.

## 5.2 Societal, user and business aspects

### 5.2.1 Citizen engagement activities

No citizen engagement activities are foreseen yet.

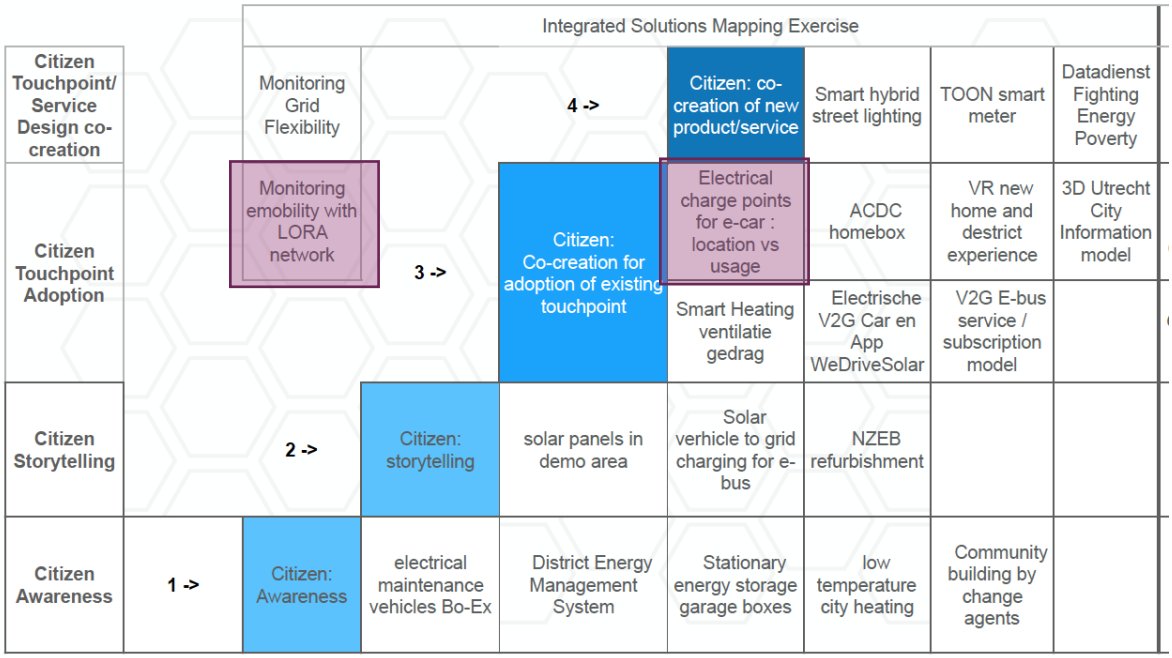



*Figure 8 Position of measure#1 in the participation ladder*

### 5.2.2 Business model

The aim of de current experiment is to investigate if a specific parking decree/rule is needed which enables the municipality to reserve public parking bays specific for the charging of electric vehicles. For every charger currently put into place such a rule costs about € 300 - € 400 per rule. Additional cost is € 150 for the traffic sign. Investment in the senor is approx. € 250. The business case for the service is € 200,- to € 300,- positive in this case.

Other to be developed services might increase further income.

### 5.2.3 Governance

Municipality of Utrecht grants the concessions to place public charging poles. The concession for 2019 was granted to WeDriveSolar (for 2020 - 2024 it is granted to Allego). Their tasks for development of this service include (1) determining the charging locations and (2) taking the traffic rule.

WeDriveSolar is the concession holder for the charging poles in this pilot. Their tasks include (1) realising loading locations and (2) unlocking availability data of the charging poles in the trial via OCPI (through Last Mile Solutions)

Communithings is the manufacturer and supplier of the sensors. Their tasks include (1) installation of the sensors in the road surface and (2) unlocking the data from the sensors to Civity.

Civity is operating the City Innovation Platform on which the data flows of the sensors and charging poles are combined to create different statuses. They are responsible for the live monitoring, sending push messages and reports.

KPN: Services the LoRa network delivering the data connection to the sensors.

## 5.3 Impact assessment

### 5.3.1 Expected impact

The data service will contribute to a more efficient use of the charging infrastructure in Utrecht and beyond. Thereby contributing to lowering the costs for charging infrastructure and optimizing charging services for e-drivers.

### 5.3.2 KPIs

No specific KPI's are defined for T5.6. The KPI's for the charging infrastructure are reported in deliverable D5.5 (TT#3 Smart e-mobility). In the next paragraph evaluation point for monitoring the results of the pilot are defined.

### 5.3.3 Monitoring plan

Figure 9 provides an overview of the data that will be generated and disclosed on the CIP. The sensors measure whether a vehicle occupies the parking space. This status is transmitted to the CIP. Based on the data form the charge point (Last Mile Solutions), the system then verifies whether there is actually a car connected to the charge point at that moment. Together, these data streams result in the following statuses:

1. Charging location unoccupied: No vehicle, no connection;
2. Charging location incorrect use: Vehicle in place, no connection;
3. Charging location correct use: Vehicle in place and a connection.

When connecting or disconnecting a vehicle, all three statuses are scrolled through. In order to keep the data clean, some adjustments are made to the display in the reports:

- When a vehicle arrives, the status will always be set to 2, because it takes some time to connect the vehicle. Status 2 is reported when no vehicle is connected within five minutes. When vehicle is connected status changes to 3.
- The same applies when an electric vehicle leaves the charging location. Status 2 is reported if the charging location has not changed to status 1 within five minutes.
- Each charging pole has two sockets and two associated charging poles with sensors. A user can connect his vehicle to socket A, but be parked on sensor B. In the report, the socket and parking bay do not have to match, but instead the number of occupied parking bays and sockets in use are measured.

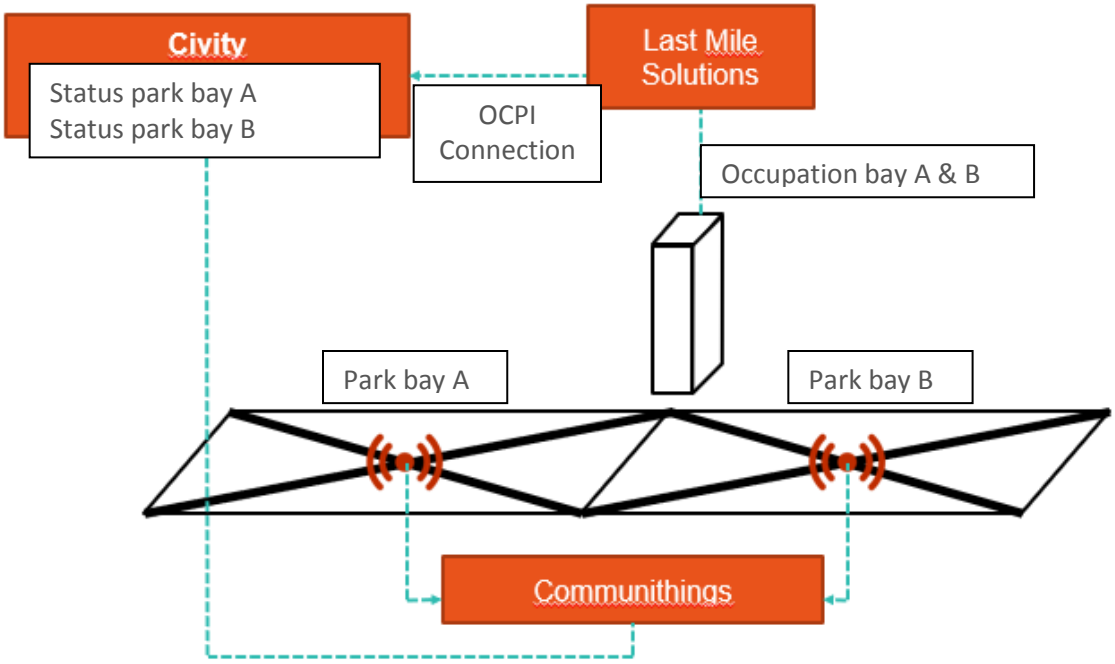



*Figure 9 Overview of the data streams that will be generated*

Civity will build a dashboard, which will show the "live" status at the different parking bays. In addition to the live monitor, Civity will produce weekly short management reports with the usage statistics of the loading locations. This is includes:

- Number of loading transactions at the loading locations.
- Number of times and percentage of the total number of loading locations times status 2.
- Number of times and percentage of the total number of loading locations times status 3.
- Number and duration of status 2 per loading location.
- Number and duration of status 3 per charging location.

For evaluation of the pilot the following results are expected.

- Expected false use of charging bays with traffic rule = 20%
- Aimed false use of charging bays with sensor and no traffic rule = 25%
- Aimed false use of charging bays with sensors and with traffic rule and additional law enforcement = 5%

Monitoring starts in January 2020 and data will be collected for at least 2 years. After 3 months generated data will be thoroughly analysed and decision will be made on potential development of a data-service.

## 5.4 Commissioning Plan

Focus until the end of 2019 is on:

- installation of the sensors;
- collecting and disclosing data on the CIP;
- providing the EV pole operator with information on the (mis)use of the parking bays;

- analysing collected monitoring data.

After evaluation of the monitoring data (beginning of 2020) it will become clear if misuse of parking bays is a big problem or not. This will also be point in time to see what data-services could be develop by combing different data sources. This process will be further detailed in 2020.

*Table 4 Commissioning plan measure#1*

| Phase | Activity | Parties involved | Responsibility |
|---|---|---|---|
| **1 Design** | Set up Programme of Requirements<br>Set up preliminary design | Municipality of Utrecht<br>Civity<br>WeDriveSolar | Municipality of Utrecht |
| **2 Engineering** | | Civity<br>WeDriveSolar (Last Mile Solutions) | |
| **3 Contracting** | Contracting subcontractors | Municipality of Utrecht<br>Communithings | Municipality of Utrecht |
| **4 Realization** | Installation Sensors<br>Installation Chargers | WeDriveSolar<br>Communithings<br>Civity | Municipality of Utrecht |
| **5 Testing** | Testing data connections<br>Testing sensors | WeDriveSolar<br>Communithings<br>Civity | Municipality of Utrecht |
| **6 Completion** | Monitoring | Municipality of Utrecht<br>Civity | |

## 5.5 Implementation of the measure: planning and progress

### 5.5.1 Planning of activities

The measure is implemented in 3 phases. Installation is finished January 2020. Monitoring and evaluation is due Q3 2020.

*Table 5 Timing of activities of measure 1 - Monitoring E-Mobility with LoRa network*

| Part | Ready |
|---|---|
| **Phase 1: Preparation & Realization** | **Jan 2020** |
| Determine locations and setups | August 2019 |
| Installation of sensors | December 2019 Januari 2020 |
| Link Backoffice LMS and Civity | December 2019 |
| Description GDPR compliance | September 1 |
| **Phase 2 : Operation & Monitoring** | **July 2020** |

| | |
|---|---|
| Report | Jan - July |
| Progress consultation | Jan - Jul |
| **Phase 3: Evaluation** | **August 2020** |
| Qualitative with stakeholders | August 2020 |
| Delivery report | September 2020 |

### 5.5.2 Planning of costs and (equipment) investments

Investments in sensors are done Q3 and Q4 2019: € 10.000

Exploitation cost: € 250 per month sensor service fee for the back-office services

### 5.5.3 Progress achieved up to M24

Pilot started in May 2019. The following actions and results have been achieved:

- Projectplan (july 2019)
- Ordering Sensors (august 2019)
- Location selecton (august 2019)
- LoRa connections KPN installed (November 2019)
- Installation 10 sensors (December 2019)
- CIP connection Last Mile Solutions (December 2019)
- Installation 30 sensors (Januari 2020)

## 5.6 Conclusions

So far, the pilot is developing successfully. Cooperation between involved IRIS project partners Municipality of Utrecht, LomboXnet and Civity is established, leading to task and budget assignment and planning. Also, procurement of equipment (parking sensors) and cooperation with Communithings is established. After the sensors are put into place and monitoring starts further conclusions can be drawn.

# 6 Measure#2: Smart Street Lighting with multi-sensoring

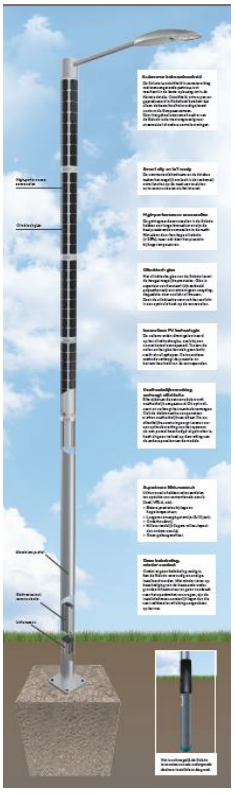
## 6.1 Specifications

The GA stated the objective to introduce Smart Street Lighting in Kanaleneiland-Zuid, which encompasses equipping lamp posts with smart multi-sensors. Data collected through these sensors should be used to enhance data driven district policies aimed at reducing/minimizing problems faced by the citizens in public space.

The municipality of Utrecht is currently facing the procurement for replacement of 60.000 lamp posts within the city. A tender will be put into the market. The municipality of Utrecht wants sensor and connectivity services to be a part of this procurement. The city aims at deriving lessons from the IRIS project to put a successful tender into the market for the 60.000 lampposts.

*Lamp post as a Modular Hub*

To develop new and innovative sensor and connectivity services on lamp posts it is necessary to rethink the lamp post as a Modular Connectivity and Sensor Hub. The hub is a completely modular structure and can accommodate various functions. Parking machine, e-charging point, public market electricity supply, event connection electricity supply, axle load measurement, smoothness measurement, neighbourhood AEDs, street lighting fixture, camera for surveillance, camera for environment, all kinds of sensors, radar, 5G antenna and equipment. The hub has an electricity connection and fiber optic connection. The hub has been carefully designed and fits the street scene.



### 6.1.1 Technical specifications (hardware & software)

Measure #2 is developing in 2 stages:

1. Pilot Smart Lighting Kanaleneiland-Zuid
2. Tender city-wide 60.000 Smart Lamppost

*Stage 1: Pilot Smart Lighting & crossing*

To establish this objective a “smart pedestrian crossing” will be realised in Kanaleneiland Zuid including the following design elements:

- A smart pedestrian crossing with luminous white strips with LED lighting. Sensors that detect the proximity of traffic and pedestrian control the light.

- Multiple sensors attached to a Smart Pole on one side of the crossing. The smart pole is a light column in which various functions can be accommodated, such as cameras, measurement sensors for noise levels and air pollution, dynamic lighting, but also traffic detection. The sensors can distinguish between traffic type and speed.
- Collection and assessment of data via the Luminext management system. It must be further determined which communication platform best fits the desired applications. (Lora / 2G, 4G / Powerline or a combination).
- Power supply through the municipal public lighting grid, combined with a solar panel that can feed back into the municipal public lighting grid, recharge a battery and/or is connected to the apartments' smart energy grid (all depending on location and feasibility).

The data collected with the sensor attached to the smart pole will be transferred and disclosed on the CIP. The main purpose of this stage is to learn what it means to implement sensors, connectivity and smart lighting in public space. The municipality needs these lessons to be able to implement third party (commercial) services in the second stage.

*Stage 2: Tender city-wide 60.000 Smart Lampposts*

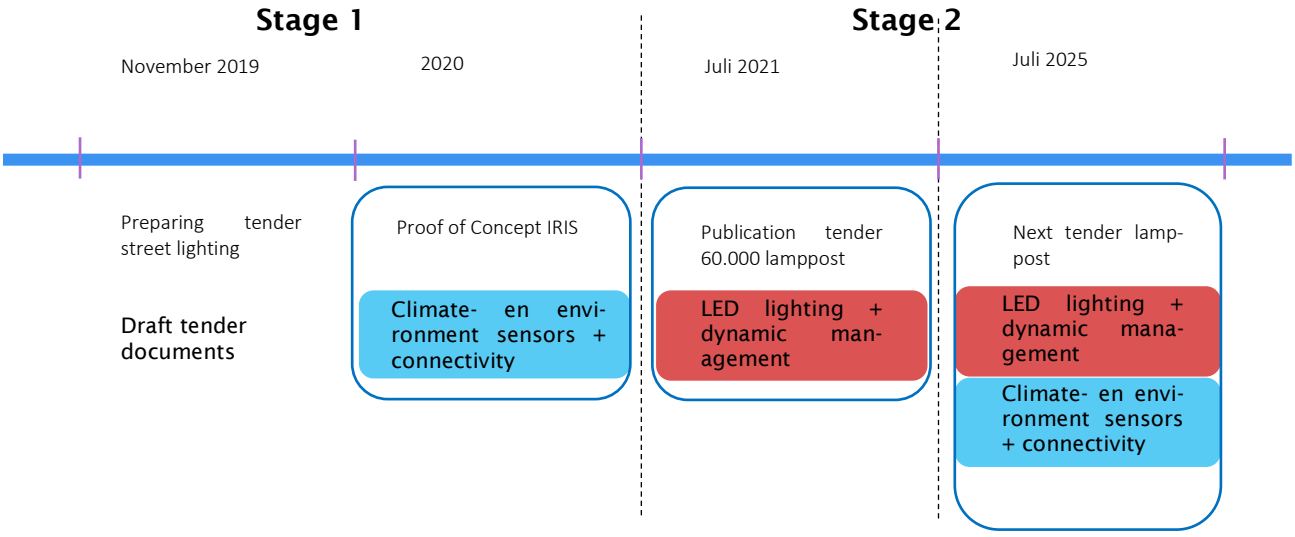



*Figure 10: Planning smart street lighting Municipality Utrecht*

The second stage of the project is aimed at developing city wide (commercial) services on the lampposts that will be renewed. The tender for the replacement of the city's lampposts will be granted in two stages. The first stage in 2021 is aimed at replacement by LED-lighting and remote dynamic light management. In the second stage sensor and connectivity services will be added. The second stage tender is due in 2025.

### 6.1.2 Procurement of equipment and/or services

The procurement of equipment is described in deliverable 5.3 (TT #1). This deliverable describes market approach strategies on how to procure the services now and in the next stages. To make these services possible the municipality of Utrecht needs to change the position it has as an owner and curator of the lighting infrastructure into a concession holder for different services. To facilitate this process rightly, the role the municipality takes, and the procurement model that is used can and will differ. The table

below shows the different possibilities. These possibilities and different options will be further investigated in this project.

*Table 6 Overview of possible market strategies for different services*

| ***Service*** | ***Stage 1: IRIS project 2019-2023*** | | ***Stage 2: follow-up tender (5% lighting poles) Option 1*** | | ***Stage 2: follow-up tender (5% lighting poles) Option 2*** | |
|---|---|---|---|---|---|---|
| | **Role** | **Procurement model** | **Role** | **Procurement model** | **Role** | **Procurement model** |
| ***Street lighting (lamp-post and power supply)*** | Ownership | Procurement | Ownership | Procurement | Ownership | Procurement |
| ***Light service (lamp fixture)*** | Ownership | Procurement | Ownership | Procurement | Concession provider | Performance contract |
| ***Installation service (lamp fixture)*** | Ownership | Procurement | Ownership | Specifications with purchase of management service | Concession provider | Operating contract |
| ***Sensor service (lamp fixture)*** | Ownership | Procurement | Concession provider | Through agreement with the municipality conducted within the administration 's authority | Concession provider | Service of concessionaire with its own agreements with sensor service provider (TPA arranging PoR and operating contract). |
| ***Telecom service (5G) (fixture)*** | Operation agreement with KPN for 5G service. | Service Contract | Concession provider | Through agreement with the municipality conducted within the administration 's authority | Concession provider | Service of concessionaire with own agreements with telecom service provider (TPA arranging PoR and operating contract). |

## 6.2 Societal, user and business aspects

### 6.2.1 Citizen engagement activities

The first stage of the project (pilot Kanaleneiland-Zuid) data services have been developed in co-creation with the citizens of this neighbourhood. To develop a meaningful data service, it is necessary to get a good insight on the problems faced by the citizens in Kanaleneiland-Zuid in public space and select problems that potentially can be solved through the introduction of smart street lighting and related data services. Public surveys among citizen in Kanaleneiland e.g. show dissatisfaction regarding transport above the average for Utrecht; citizens experience more traffic noise and feel unsafe when parking. (Source: Wijkwijzer: https://wistudata.nl/dashboard/wijkwijzer).

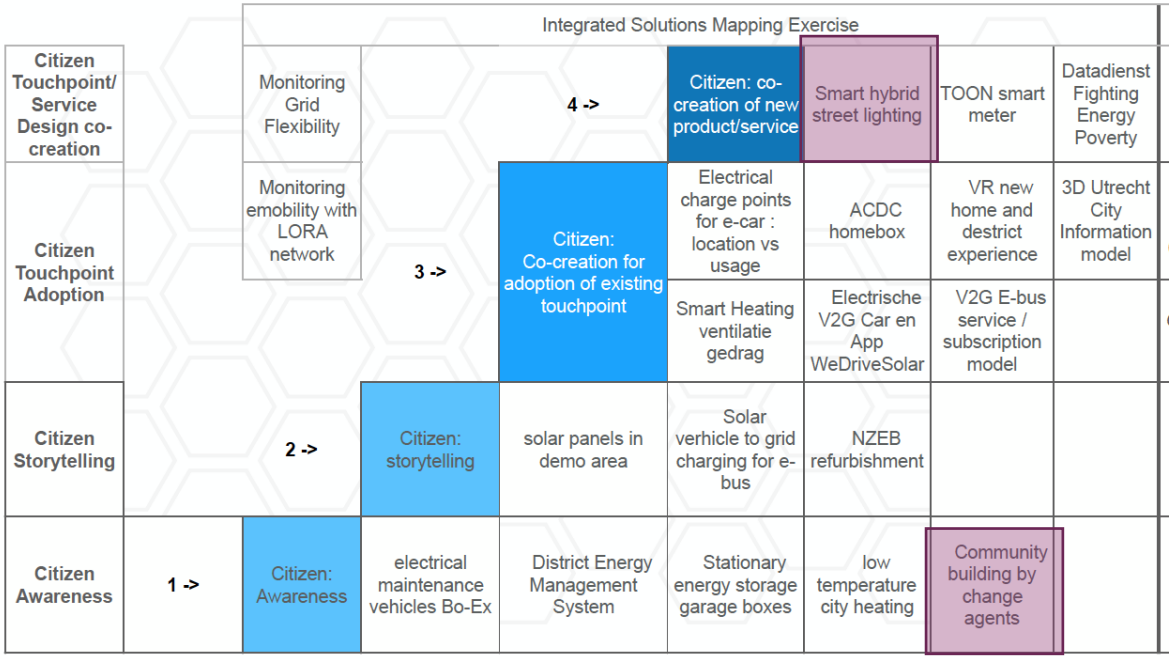



*Figure 11 Position of measure #2 in the participation ladder*

A successful first citizen engagement and co-creation process around the development of smart street lighting solutions was carried out in June 2018. With a diverse group of stakeholders including residents, entrepreneurs and market parties several concepts were developed. In this workshop a design thinking approach was followed.

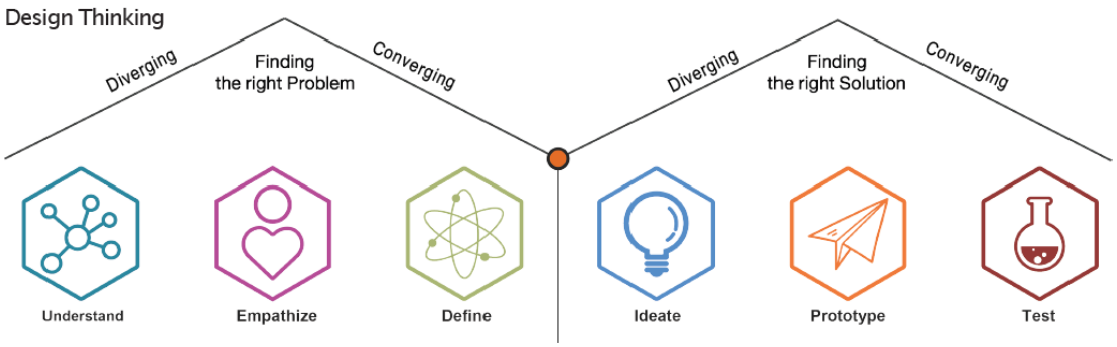



*Figure 12 Design thinking approach*

The idea that received most support was a smart pedestrian crossing. Next the municipality of Utrecht and Luminext assessed the concept of a "smart pedestrian crossing" regarding feasibility, costs and sustainability. This resulted in concept including the elements listed in the previous paragraph. This concept was further discussed and detailed (co-creation) during a follow up workshop with stakeholder before the summer of 2018. Next the "smart pedestrian crossing" will be implemented, tested and monitored together with end-users.

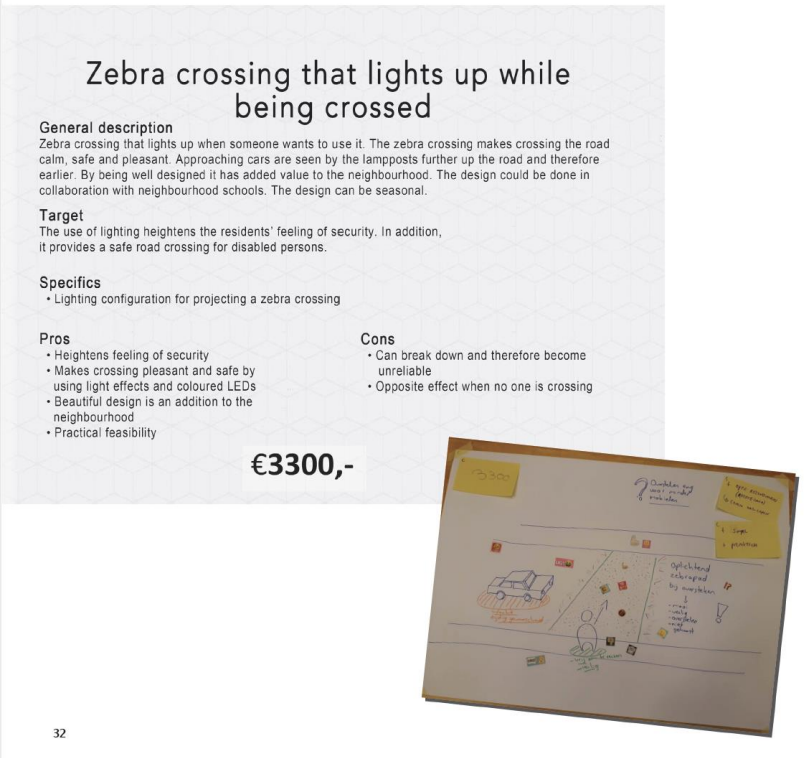



*Figure 13: Posed idear of smart pedestrian crossing*

In June 2019, a second co-creations sessions was organised together with citizen. In this session the city of Utrecht presented its first design of the "smart pedestrian crossing" and together with citizens functionalities (pictured right) and location (pictured left) of the crossing were determined.

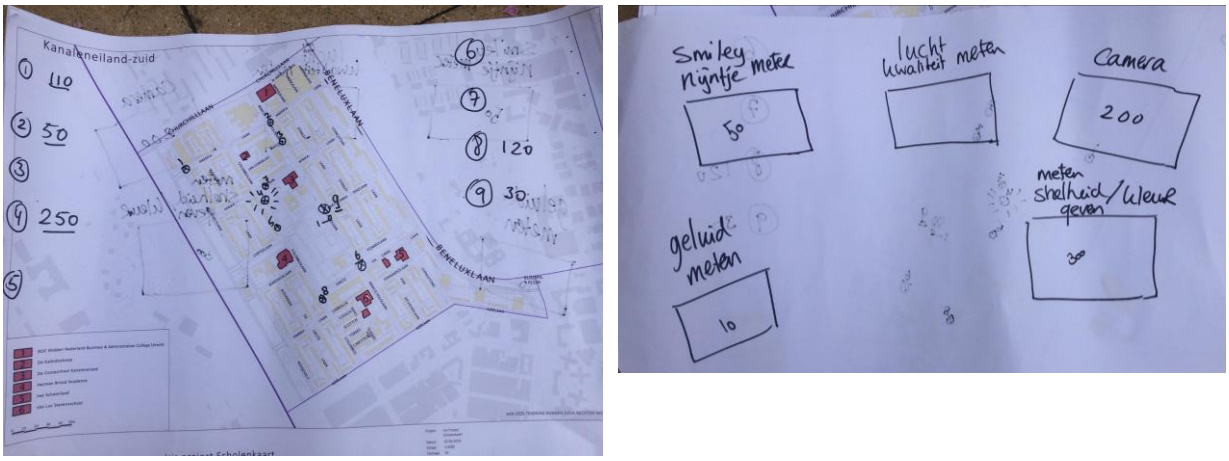



*Figure 14: Results of the second co-creation session*

### 6.2.2 Business model

Concession model for the exploitation of sensor and connectivity services offers in the long run possibilities for a profitable business model. We learned this from the exploitation of public EV-chargers. The city of Utrecht started granting concessions for public charging services from 2013 onwards. A charging point operator is selected on the basis of price and quality and wins the right to operate public chargers for a certain amount of time. The first year the operation had a negative financial result and public subsidies were needed to develop the market. Over a few years scaling effects reduced cost and the demand for charging services grew. Now the market is mature and in the most recent concession the city earns 6 cent per kWh charged on public chargers contributing to a total of € 2 to € 6 mln in 10 years.

On the long term similar exploitation models can be implemented for smart street lighting. Expected revenues for sensor services are difficult to predict. Expected is that sensor services will mainly be used for policy making and public management information services therefor giving social value.

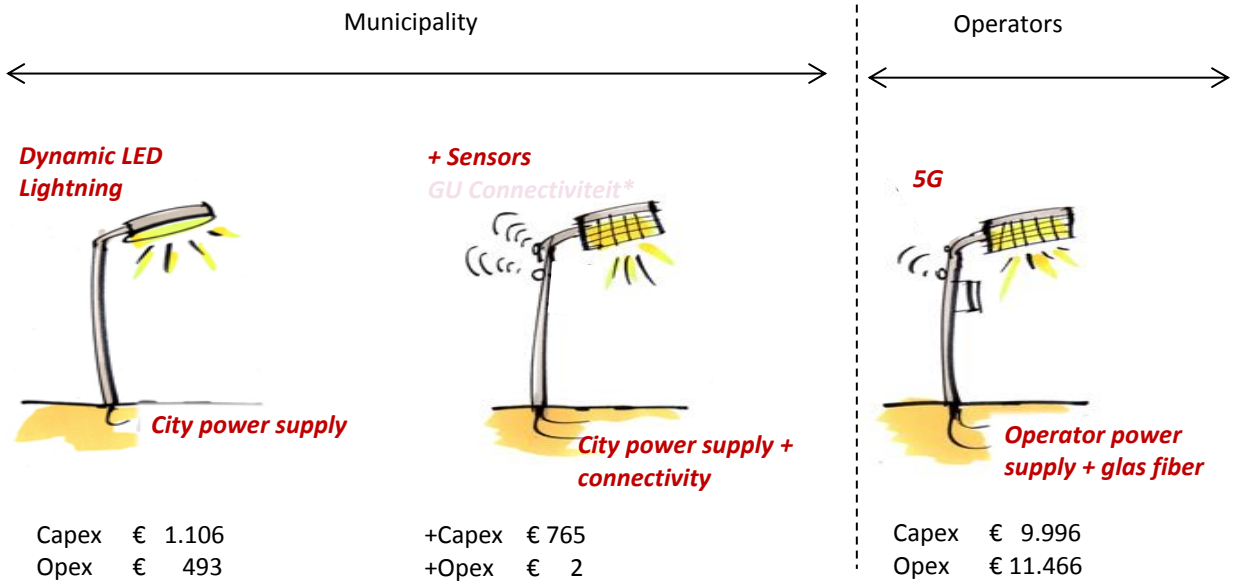



*Figure 15: Estimated investments for 60.000 light posts in Utrecht (source: Municipality of Utrecht)*

The Dutch knowledge network *OVLNL Smart Lighting* estimates revenues from commercial connectivity services such as 5G or WIFI at € 600 to € 1.200 per lamp post. In the long term positive business case for the exploitation of connectivity services can be expected.

### 6.2.3 Governance

City of Utrecht is responsible for design, implementation, operations and management of the smart pedestrian crossing. In the second stage the municipality takes a role as a concession provider

Luminext is responsible for processing and managing the data that are generated with the sensors connected to the smart poles. These data will be stored in Luminext own management systems (Luminizer).

Civity is operating the platform to which the sensor data is collected. They are responsible for disclosing the collected data on the CIP.

## 6.3 Impact assessment

### 6.3.1 Expected impact

*Stage 1: pilot Kanaleneiland-Zuid*

In the first stage local impact on traffic safety can be expected. On top of that, sensor data on environmental issues is gathered. The main goal of this pilot is to learn how smart street lighting can be developed in public space. Greater impact can only be expected in the second stage.

*Stage 2: tender 60.000 lamppost*

In the second stage major impact is expected on several city policy goals. The impact is shown in the figure below.


*Figure 16 Impact smart street lighting on different policy goals*

### 6.3.2 KPIs

No KPI's are defined for this data service. The KPI's for the smart street lighting are reported in deliverable 5.3 (TT#1 Smart renewables and near zero energy district).

Evaluation points are:

- What is the demand for information services from the municipality?
- How is the collected data used (public services, policy development, commercial services)?
- What are effects on traffic safety?

### 6.3.3 Monitoring plan

The measure will generate the following data:

- Traffic sensor data: Sensors that detect the proximity of pedestrian and traffic to control the light). The sensors can distinguish between traffic type and speed.
- Multiple sensor data: cameras, measurement sensors for noise levels and air pollution, dynamic lighting, but also traffic detection.
- Power metering data: through the municipal public lighting grid, combined with a solar panel that can feed back into the municipal public lighting grid, recharge a battery and/or is connected to the apartments' smart energy grid (all depending on location and feasibility).

The data collected will be transferred and disclosed on the CIP. The main purpose of this stage is to learn what it means to implement sensors, connectivity and smart lighting in public space. The municipality needs these lessons to be able to implement third party (commercial) services in the second stage.

Collection and assessment of data will be done via the Luminext management system. It must be further determined which communication platform best fits the desired applications. (Lora / 2G, 4G / Powerline or a combination).

## 6.4 Commissioning Plan

The design and specification is commissioned by the municipality in co-creation with the citizens. The smart ligthpoles will be delivered by the IRIS partner Eneco. Ground work is contracting by the municipality within a blanket order. Within this order the smart crossing will be contracted. Field test and data connetions are tested by Civity and results are shared with the municipality and BOEX. The City of Utrecht will report on the results.

*Table 7: Commissioning Plan Smart Street Lighting*

| Phase | Activity | Parties involved | Responsibility |
|---|---|---|---|
| **1 Design** | Co-creation session | City of Utrecht, BOEX, citizens | City of Utrecht |
| **2 Engineering** | Functional specification | City of Utrecht, Civity, BOEX | City of Utrecht |
| **3 Contracting** | Contracting Luminext | BOEX, City of Utrecht | BOEX |
| **4 Realization** | Placing smart lightning | Luminext | BOEX |
| **5 Testing** | Field test, data connection test | City of Utrecht, Civity, BOEX | Civity |
| **6 Completion** | Gathering lessons learned for tender 2021 | City of Utrecht | City of Utrecht |

## 6.5 Implementation of the measure: planning and progress

### 6.5.1 Planning of activities

The placing of the smart lighting and the smart crossing is due for summer 2020.

*Table 8: Timing of activities of measure 2 – Smart Street Lighting with multi-sensoring*

| Phase | Activity | Planning |
|---|---|---|
| **1 Design** | Co-creation session | July2019 |
| **2 Engineering** | Functional specification | Nov-Dec 2019 |
| **3 Contracting** | Contracting Eneco, contractor for ground word | Jan 2020 |
| **4 Realization** | Placing smart lighting | Summer 2020 |
| **5 Testing** | Field test, data connection test | 2020-2021 |
| **6 Completion** | Gathering lessons learned for tender 2021 | 2021-2022 |

### 6.5.2 Planning of costs and (equipment) investments

Contracting Eneco (Lunimix) and contractor € 75.000 Jan 2020

### 6.5.3 Risk management

The highest risks are foreseen in stage 2:

1. Flexibility is put into the tender to allow future services for a) climate & environment and b) connectivity. This may cause the costs for the tender to be higher than expected.

Mitigation measures that emerge from the pilot in the IRIS project:

- Pilot in IRIS project to get a grip of prices and cost effects
- Benchmark prices

2. If the right people are not involved, this can cause a delay (politically) or an incorrect tender.

- Required and correct capacity available
- Indicate if and when politically involved and realize correct inputs / introductions

3. We may be too cautious when designing tendering procedures

- Sufficient speed to really direct control yourself?
- Do we make sufficient use of the fact that we can now play a coordinating role?

### 6.5.4 Progress achieved up to M24

Stage 1:

- Co-creation session finalised
- Functional specs
- Procurement started

Stage 2:

- Procurement team aligned
- Assignment of project manager for stage 1 and stage 2

## 6.6 Conclusions

The measure Smart Street Lighting has started off as a solitaire pilot within the IRIS project. The specifications have been made in co-creation with the neighbourhood and the resulting smart pedestrian crossing will be implemented in summer 2020. After installation monitoring and data management can start. The city hopes to derive lessons from this first stage pilot to the city-wide tender for smart street lighting. To make this connection possible a project manager for the pilot (stage 1) and the tender (stage 2) will be assigned.

# 7 Measure#3: 3D Utrecht City Innovation Model

The municipality of Utrecht wants to stimulate the use of 3D home and district modelling as a way to increase citizen engagement in urban planning. Experience shows that participation leads to better projects, better considerations and decision-making and more support for finally selected solutions. Among others the municipality wants to enhance citizen engagement in urban planning by offering data services to citizens visualizing the impact of different scenarios for a specific area by making use of data stored in a 3D model brought together in a catalogue through the City Innovation Platform (CIP).

In the first 2 years of the project explored the potential use of 3D home and district modelling as a way to increase citizen engagement. Two different projects are developed within this measure:

1. App "Mijn Woonwijk"
2. Livinglab 'Omgevingsvisie'

This deliverable reports progress on both projects.

## 7.1 Specification

### 7.1.1 Technical specifications

#### 7.1.1.1 App "Mijn Woonwijk"

In the first project developed within measure is a Minimal Viable Product (MVP) *"Mijn Woonwijk"*[1] was developed and tested among a limited number of users. The objective this App is to increasing involvement of citizens in the changes and new projects in their neighbourhood (see Figure 17). The goal is to learn how citizen engagement can be approved by using this digital application. The app included the following features:

- *Informing* citizens about present and future changes. It explains what these changes contain and where these changes will take place. Citizens can filter this long list of changes by indicating their preference. For example, people can indicate which changes they want to be informed about like road infrastructure buildings or supermarkets. Moreover, they can indicate the radius from their home for which they want to be informed about change. Eventually¨ they can also indicate specific neighbourhood of interest.
- *Viewing* all changes and projects on a map. When citizens click on a specific change or project in the map¨ people can see these projects in a 3D model. For example, when the municipality is planning to build a new flat in a certain neighbourhood¨ people can see how this building is going to look like in 3D the shadows it will cast and more. Moreover, they can look around the building and see how the new building fits into their neighbourhood.

[1] Detailled report can be downloaded from the IRIS-Utrecht website

- *Giving their opinion* regarding a future change or project. People can *vote* for or against project. If you think that a change will add value to the neighbourhood¨ citizens can vote positive Otherwise¨ citizens can vote negative. People are only allowed to vote once and are only allowed to vote for a project, which is close enough to their home. Reacting positively or negatively for a construction or change can only be done using your DigiD logins.

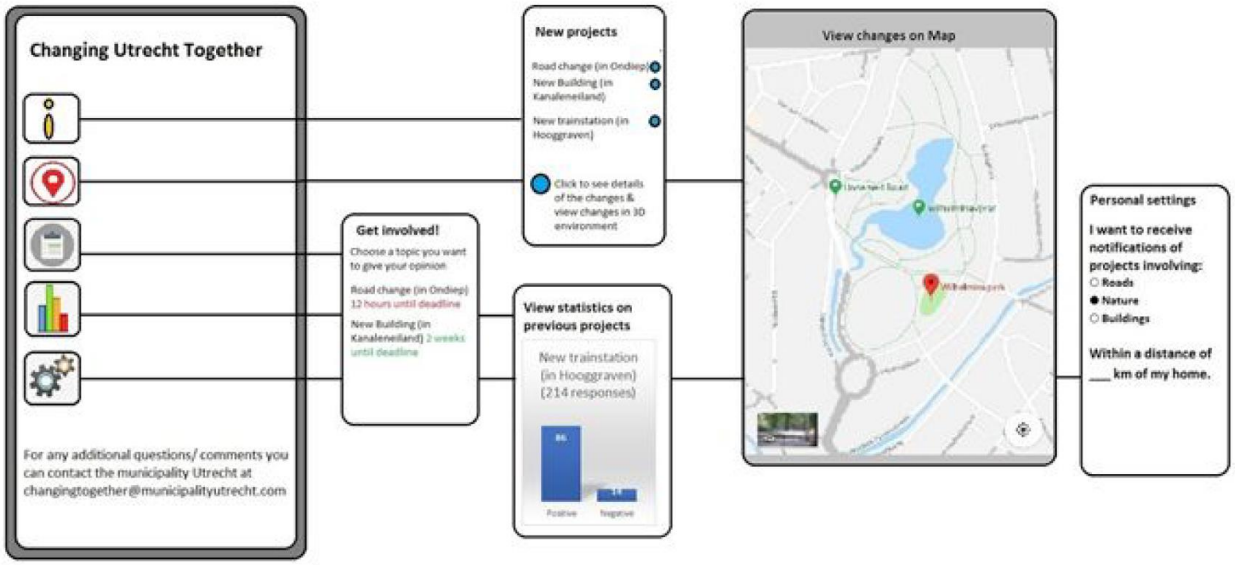



*Figure 17 Overview of the MVP "Mijn Woonwijk" developed to test potential for use of 3D data*

### *7.1.1.2 Living lab 'Omgevingsvisie'*

The second project is the development a '3D City Information Model application'. In a first draft IRIS project partner Civity developed a 3D model (see Figure 18) for the Kanaleneiland district in Utrecht. This model is a data-based 3D representation of the district and provides insight into the energy performance in Kanaleneiland. The application includes information from various system and application domains. This was a first attempt of 3D visualization that potentially can support integrated city planning and promote the involvement of citizens.


*Figure 18 Screenshot of the 3D city information model application*

In a second stage within this project this 3D model will be used within the livinglab “Omgevingswet”; a participative development of urban vision of the city district Kanaleneiland (district Zuid-West). Driven by a new national planning regulation law called “Omgevingswet’, the municipality is now taking a second step into 3D modelling as a planning tool. The city district ‘Zuid-West’, that also contains the neighbourhood Kanaleneiland-Zuid, is selected to be a pilot area for the new urban planning law called ‘Omgevingswet’. The planning law requires an integrated plan and vision from the municipality that gives the citizens frameworks to live, do business and innovate. At the push of a button, a citizen must understand what the municipality is aiming for in a part of the city, how the citizen can contribute to this and why that is important. Transparency is key.

To reach this goal the city aims at developing a 3D city model or digital twin filled with different data sources. In the Living Lab a first draft of this digital twin will be developed. Because it’s a fist version and a pilot one specific theme is chosen as a pilot to work on. This theme is energy or sustainable development. Within the Living Lab a application is developed that will support the development of the new planning vision. What is the question, which data is part of that, and how do we apply the solution within the vision?

Technology and data available via the Spotinfo Environment Server. The data will be stored in the CIP and displayed in the 3D city model (Spotinfo Environment Server).

### 7.1.2 Procurement of equipment and/or services

Within the two projects within this measure all development is done in house with IRIS partners. So no procurement is made.

## 7.2 Societal, user and business aspects

### 7.2.1 Citizen engagement activities

#### 7.2.1.1 Mijn Woonwijk

As part of the IRIS project University Utrecht developed an app with the purpose of involving citizens more in the changes and new projects in their neighbourhoods. To sum, this app informs the citizens about new changes and projects, gives an option to vote about these changes, and gives citizens the option to share their opinion. In 2018-2019 research was conducted on how citizens like to be involved in changes taking place in their neighbourhood. This showed that:

- Citizens are not willing to participate in all the changes that could be taking place in their neighbourhood only those which affect them directly.
- Costs of getting involved were too high compared to the rewards. Despite general believe that the municipality makes efforts to contact the citizens they believe that this is just to inform them rather than make them part of the decision.
- Developing a data-service could be a valuable addition to get involvement of a broader group of citizens. Data services cannot be considered a replacement of for instance Neighbourhood Councils[2].

The interviewees are very positive about our MVP. So, the main key takeaway is that we are going in the right direction with respect to creating an app. The key takeaways with respect to the 3D model is people prefer the app over the neighbourhood council or the physical 3D models. The app has to be very intuitive and regardless of the solution proposed, it must be convenient and useful for the people.

#### 7.2.1.2 Living Lab 'Omgevingsvisie'

Within the new planning regulation data management and digital platforming for planning purposes is mandatory. For the city this leads to the new task of publishing regulation and information on environmental and planning issues online within a digital (3D) platform. The new planning regulation also implies that this information is used for developing a new integral planning vision (Omgevingsvisie) for this district for the next 10 years. The planning vision must be developed in an integral participative manner and the Living Lab is aimed at supporting this process with needed the 3D digital tooling.

[2] Neighbourhood Councils advises the City Council on local issues. The district council consists of an (independent) group of residents and entrepreneurs.

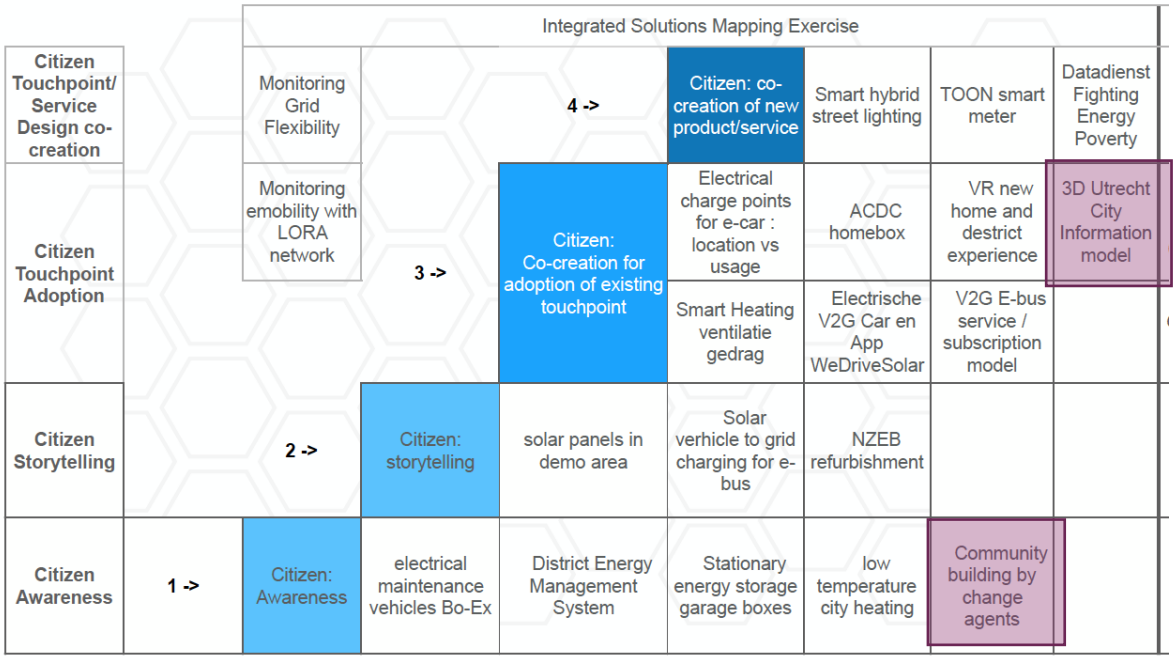



*Figure 19 Position of measure #3 in the participation ladder*

### 7.2.2 Business model

For these public services is no business model is determined.

### 7.2.3 Governance

The new planning laws lay out a clear framework for the use of digital data services within urban planning. Many of these services become mandatory and are aimed at supporting the participation process of planning and regulating environmental development in urban and regional districts.

## 7.3 Impact assessment

### 7.3.1 Expected impact

It has been explained by the municipality that changes have been taking place in the city which are not always well received by the local residents. City planners do not always have enough knowledge of the neighbourhoods and may consequently plan and approve changes which do not benefit the local residents. The city hall attempts to minimize these cases by involving residents in the planning phase of the neighbourhood. The app can help communicate changes in an easier way in the respective neighbourhoods. This can be a valuable information service for governmental organisations.

### 7.3.2 KPIs

No KPI's are defined for this measure.

### 7.3.3 Monitoring plan: how to do the actual monitoring?

Mijn Woonwijk app: The app was tested among a very limited group of users, and interviews among these users revealed that they were positive about the MVP.

Living Lab 'Omgevingsvisie':
The monitoring plan is to be determined in the Project Start-up Session. We foresee a qualitative evaluation of the use of the 3D-city model for participation purposes by preforming questionaries' whit participants and in depth interviews with the project managers of the Omgevingsvisie.

## 7.4 Commissioning Plan

#### *7.4.1.1 Mijn Woonwijk app*

As part of the IRIS project University Utrecht developed an app with the purpose of involving citizens more in the changes and new projects in their neighbourhoods. To sum, this app informs the citizens about new changes and projects, gives an option to vote about these changes, and gives citizens the option to share their opinion. In 2018-2019 research was conducted on how citizens like to be involved in changes taking place in their neighbourhood.

#### *7.4.1.2 Living Lab 'Omgevingsvisie'*

The Living Lab offers a small team of specialists, technology and data to subsequently come up with a solution for the Urban Planning Vision. An essential part of this is that it is decided to elaborate a question that is in any case part of the urban planning vision. Data and technology is already available in the form of Spotinfo and together we will improve this.

A Project Start-up Session is organized. In order to ensure that the Living Lab connects as much as possible to each Urban Planning Vision, the co-operators of the Living Lab will make working agreements for the Urban Planning Vision in order to set up a set of sprints that fit the trajectory of that vision to the maximum.

## 7.5 Implementation of the measure: planning and progress

### 7.5.1 Planning of activities

*Mijn Woonwijk app:*

- Commisioning plan: Q2-Q3 2018
- App development: Q1 2019
- Field testing Q2 2019
- Monitoring & report Q3 2019

The project is brought to a closure. No further activities will be done.

*Living Lab "Omgevingsvisie"*

- January 2020: defining roll of the 3D model within the participation process.

- February 2020: development of the model. Data collection and declosure of data in the 3D model.
- March 2020: 3 participation sessions with neighbourhood citizens in Kanaleneiland supported by the 3D city model
- April 2020: further development of the Omgevingsvisie supported by de 3D city model data services.
- Summer 2020: qualitative evaluation

### 7.5.2 Progress achieved up to M24

- A MVP “Mijn Woonwijk” has been developed.
- The app was tested and evaluated.
- A first draft for the 3D city model has been made.
- A Living Lab for the further development of this model has been started.

## 7.6 Conclusions

*Conclusions on “Mijn Woonwijk” app*

Regarding the application, our first next step would be to make some small changes in in the MVP based on the feedback we received during the interviews. Multiple interviewees mentioned that they would like to see a feature in the app which gives them the opportunity to communicate with someone of the municipality when they have questions or when something is unclear about a project. They emphasize that this communication needs to be quick and easy. Suggested is that a phone number could added to the app and people can WhatsApp their questions or confusions to the municipality. The municipality will respond to these WhatsApp’s within 24 hours. An internal forum was also suggested. However, this could be a feature which can be analysed later on more in depth as it could make the application a lot more complex. In addition, the interviewees stressed the need for a very simple app interface, where navigation was mostly done intuitively and without too much reading.

*Conclusions on Living Lab “Omgevingsvisie”*

The first steps developing a 3D City Model have been made. The new planning regulation ‘Omgevingswet” and the development of a new Urban Planning Vision for the district offer a perfect opportunity to bring the development to a higher plan and use the model of digital twin in a real live demonstation for a participative development of the Urban Planning Vision of Kanaleneiland. A project team is assembled and the project kick off is early 2020.

# 8 Measure#4: Monitoring Grid Flexibility

## 8.1 Specification

The developed data service is a DSO Grid Flexibility Service aimed at trading needed local grid capacity by the DSO Stedin. The aim of the pilot is to gain experience with the actual realization of a business case for energy services on assets (battery storage, PV panels, electric vehicles etc) and how to use these assets within an energy ecosystem as created within IRIS (see TT#2). An underlying goal is to give Stedin and other parties better insight into the potential of flex services for reducing effect on peak loads in the grid and in the future avoiding heavy grid investment.

### 8.1.1 Hardware

The flexibility service is developed and tested within the energy system that is installed in the IRIS project in Kanaleneiland Zuid. The district energy system will connect energy consumers, energy producers and energy storage providers including the following components:

- PV panels on the roofs of the apartment buildings
- Solar V2G charged e-cars
- Stationary battery storage
- Hybrid heat pumps

Specification on the hardware is found in Deliverables 5.3, 5.4 and 5.5.

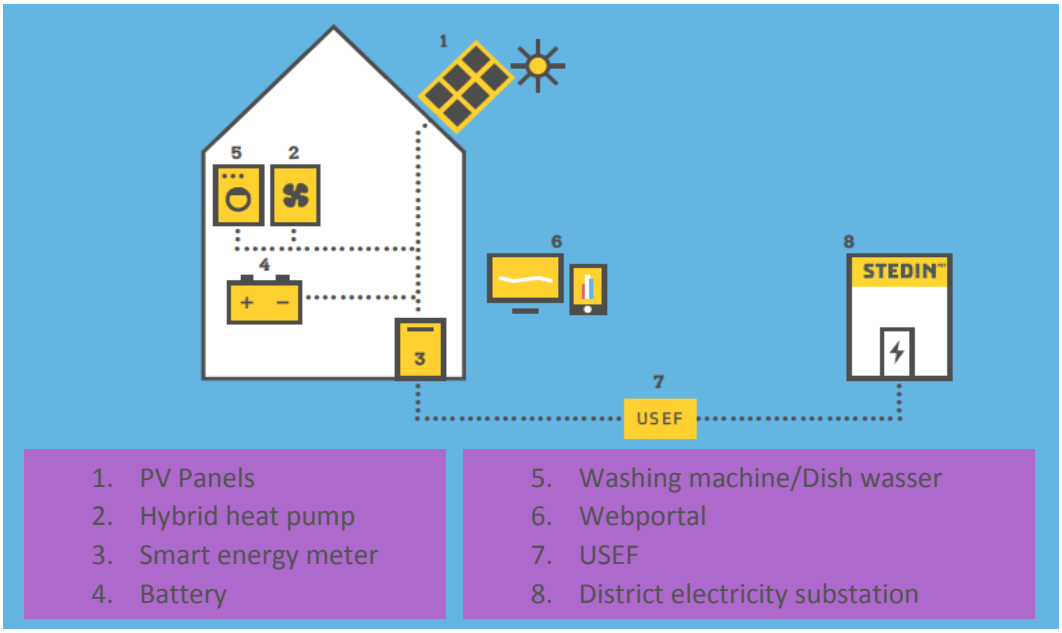



*Figure 20: Element of the smart energy system in Kanaleneiland Zuid*

### 8.1.1 Software

The DSO Stedin designed a flex chain for congestion management based on the principles of USEF communication protocals and the GOPACS congestion flex trade market. This chain is the standard for Stedin and with that it is the basis for the pilot within IRIS for the communication protocols for the flex trade. This flex chain, with the adjustments necessary for IRIS and the realization of the data links, will be used for this pilot.

*Market platform GOPACS*

GOPACS is an important step to mitigate capacity shortages in the electricity grid(congestion) and thus contribute to keeping the Dutch grid reliable and affordable. GOPACS is a unique initiative in Europe and has resulted from active collaboration between the Dutch national grid operator (Transmission System Operator, TSO) TenneT and the regional grid operators (Distribution System Operators, DSOs).

The energy transition and economic growth require capacity increase of the electricity grid. The grid operators are working hard on increasing this electricity grid capacity to be able to meet the growing demand. However, this cannot be realised overnight. Making use of flexible power from the market can contribute to solving (expected) congestion in the electricity grid. This is where the new GOPACS platform comes in.

GOPACS works in a way that is consistent with key European directives that relate to market-based mitigation of grid congestion and offers large and small market parties an easy way to generate revenues with their available flexibility and contribute to solving congestion situations. The collaboration among the grid operators also prevents congestion in one part of the electricity grid from causing problems elsewhere in the electricity grid at one of the other grid operators.

For GOPACS the grid operators collaborate with the intraday market platform of ETPA. They are currently having talks with other market platforms to connect these to GOPACS as well. The other Dutch DSOs Enduris, Coteq and Rendo, support this initiative and are investigating how they can participate in GOPACS.

Communication standard USEF

USEF is one common standard on which to build all smart energy products and services. It unlocks the value of flexible energy use by making it a tradeable commodity and by delivering the market structure and associated rules and tools required to make it work effectively. USEF fits on top of most energy market models, extending existing processes to offer the integration of both new and existing energy markets. It is designed to offer fair market access and benefits to all stakeholders and is accessible to anyone internationally.

## 8.2 Societal, user and business aspects

### 8.2.1 Citizen engagement activities

The development of the Flexibility Services is business driven. For the service development no citizen involvement is at hand. The citizen engagement activities are:

- Tenants and citizens of the demonstration area are asked to co-create the physical design of the Battery Storage that will be placed in public spaces. Dwellers are given different design options (green, artwork, other) and can vote for their preferred choice.
- Elements of the energy system can be put into de 3D model (measure #3) to see how changes impact the grid and energy costs.

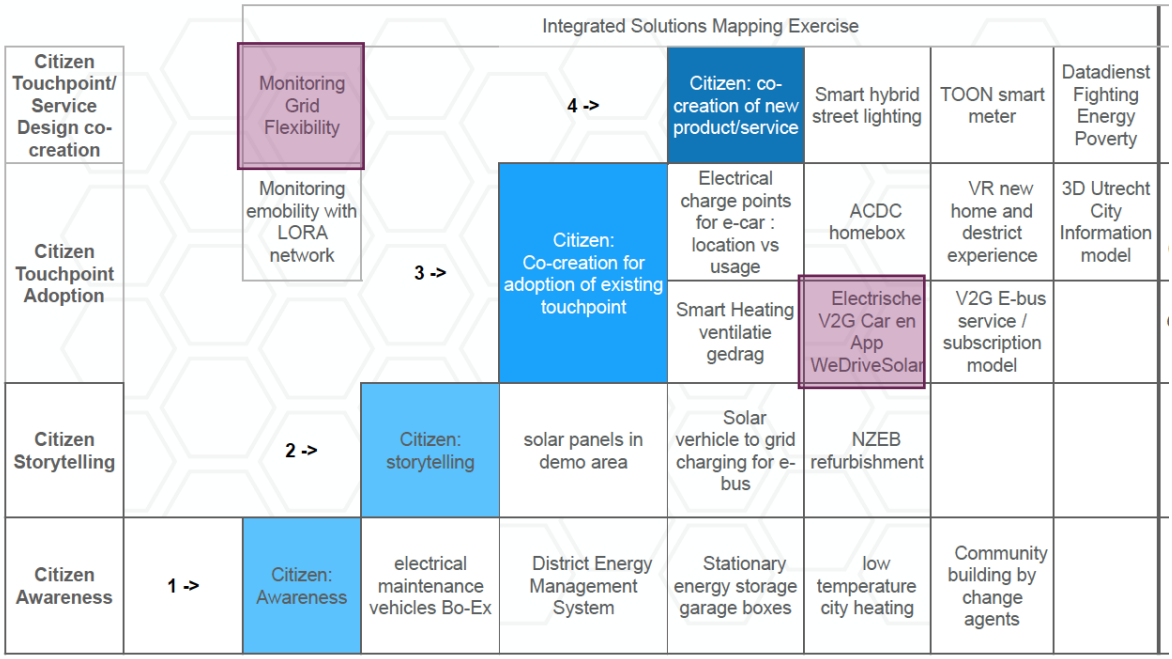



*Figure 21 Position of measure #4 in the participation ladder*

### 8.2.2 Business model

Due to the uptake of decentral renewable energy production, electric mobility and electric heating the demand for electricity is on a rise. On top the availability of electricity will become dependent on sun or wind availability. The local balance between demand and supply will differ and peak demand from PV solar or charging of vehicles will rise. Over time this will put stress on the local energy grid and congestion will occur (see figure below). The grid operator has two options:

1. Investments into the grid to solve these congestion issues.
2. Implement flexibility services that can partly solve peak issues in local grids.

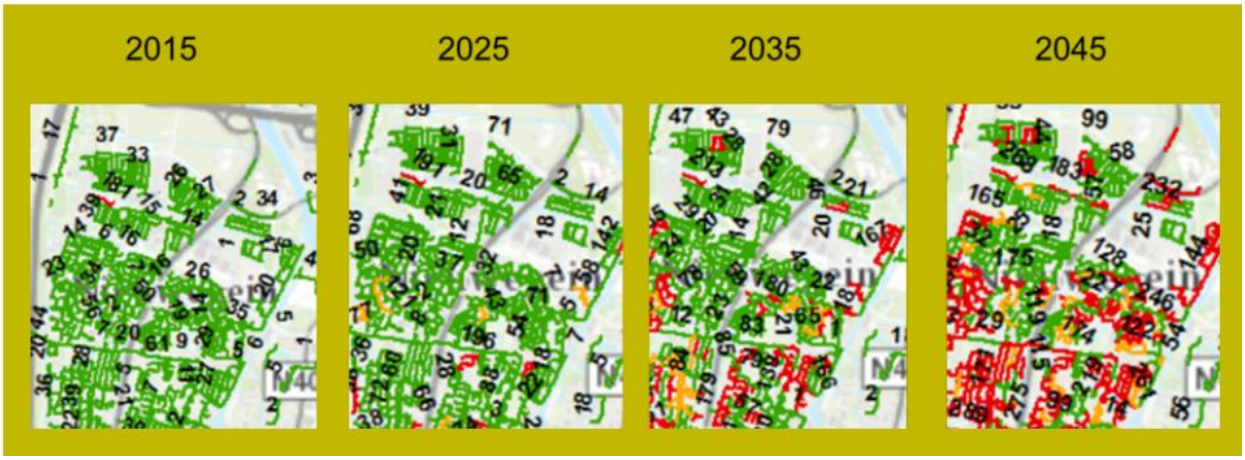



*Figure 22: Sample of prognoses of cable capacity issues on DSO network of Stedin (source Stedin)*

Through developing and testing the Grid Flexibility Service pilot grid operator Stedin wants to provide other parties with a *better understanding* of the *potential impact to reduce peak loads* in similar situations like the Kanaleneiland-Zuid area (i.e. What is the size of investment in enhancing the grid that can be avoided by making use of available flex sources in a situation like Kanaleneiland-Zuid).

Owners of the assets within the energy system (Bo-Ex and WeDriveSolar) want to gain experience with the actual realisation of a *business case for battery storage and other energy assets* and how to use the assets within an energy ecosystem, as created within IRIS.

The proposal is to have the flex assets managed and used for flexibility trading by the owner (Bo-Ex - WeDriveSolar), via one or more aggregators (in this case Scholt Energy). This in such a way that the battery is and remains fully available to be deployed to provide flexibility in all possible markets at those times when they so request. More specifically, Bo-Ex - WeDriveSolar want to sell flexibility on the primary reserve market of TenneT (FCR). For a general overview of the value creation, see the diagram below (Source: USEF).

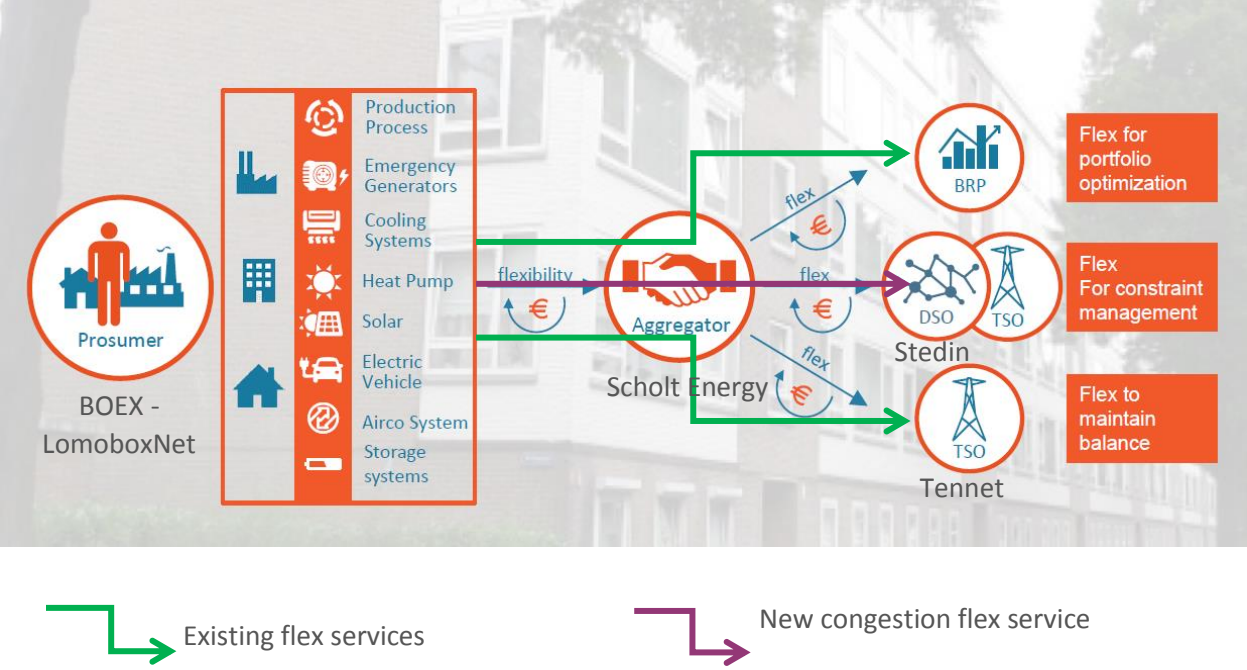



*Figure 23: market potential flexibility services (USEF)*

The diagram above shows that the grid operator, Stedin in this case, is one of the parties that could have a flex request for congestion management and can make this need known to Bo-Ex – WeDriveSolar. The request is handled by their aggregator or to a trading platform via GOPACS.

The flex is traded to determine the business case to the parties that request flex. Stedin will request for the flex and will call it administratively but not physically. It has been decided not to call in physically because no real congestion will occur, which means that Stedin will not be able to set a payment against it. For this pilot the congestion is simulated.

*Business case flex service battery*

The 850 kWh battery storage installed has a break-even on investment of 2 years. This includes subsidy. Without co-funding the break-even is 9 years. The battery has income from:

- Reserve market (TSO) € 50.000,-
- BRP balance € 3.375,-

Currently the battery is, without subsidy, not bankable. The pilot is aimed at investigating how the battery becomes more profitable if the new congestion flex service is added to the income of the battery. Also other assets within the energy system (EV chargers, solar panels) can be aggregated to the system to enlarge flexibility options. In this way a more profitable solution is offered to the asset owners and new services are developed for the aggregator. Also Stedin can profit from lower grid investments leading to a win-win situation.

| Kentallen 10 jaar | |
|---|---|
| Investering | € 497.876 |
| NPV | € 156.624 |
| IRR | 31,5% |
| PBP | 2 jaar |

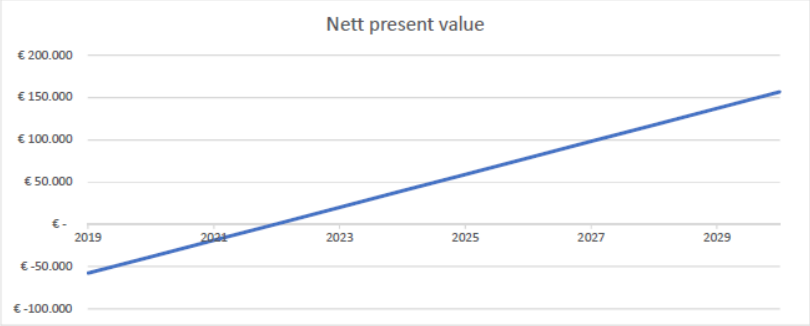



*Figure 24: Return on investment on battery (source: WeDriveSolar)*

### 8.2.3 Governance

The governance model for the demonstration is a flexibility market model that is explained below based on a fictional/dummy case. The marketplace has been developed and is called GOPACS. The data exchange standard used is USEF.

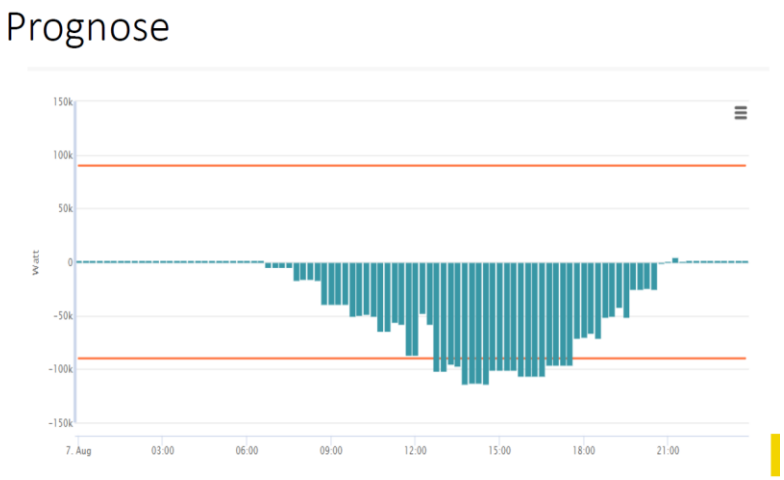



*Figure 25 Based on a prognoses (blue) congestion problems are forecasted based on available capacity (red lines)*

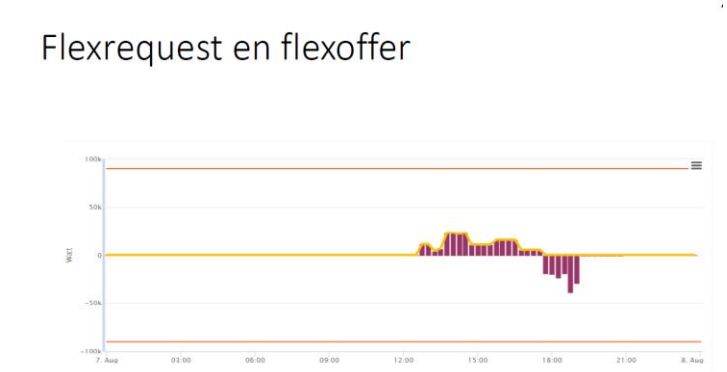



*Figure 26 The DSO (Stedin) puts a Flex Request into the GOPACS marketplace. The Aggregator (Scholt Energy) returns a flexoffer*

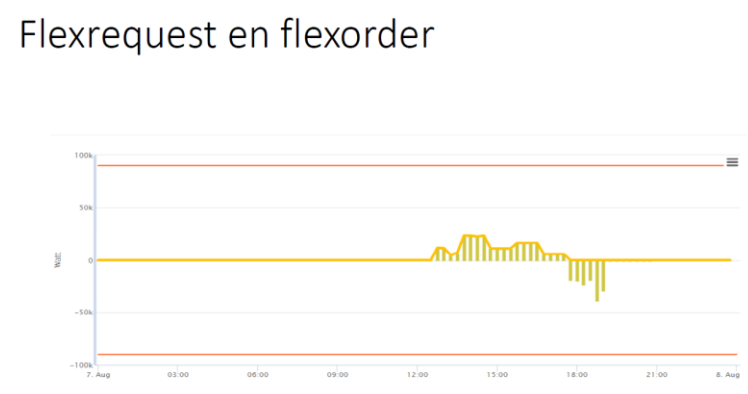



*Figure 27 The DSO confirms the Flex Offer to the Aggregator with a Flex Order.*

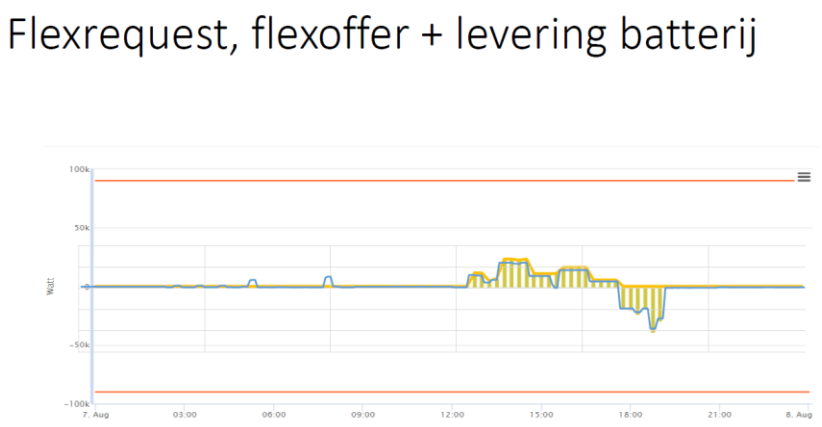



*Figure 28 The battery or other flex assets deliver the energy at the right moment and volume.*

## 8.3 Impact Assessment

### 8.3.1 Expected impact

If consumers are flexible about whether and when to use energy, they could reduce grid stress and their own energy bills. By buying and aggregating enough consumer flexibility to offer as solutions to grid operators and balance responsible parties, a central aggregator could sell it on to be used for:

- reducing grid congestion
- avoiding expensive grid upgrades
- limiting any penalties for failing to balance supply and demand
- avoiding buying energy when prices are high

These possibility can each reduce cost of the energy transition an thus keep energy available at all times and affordable for everyone.

### 8.3.2 KPIs

No KPI's are defined for this measure. The report on the KPI for the hardware and services are found in Deliverables 5.3, 5.4 and 5.5. Point for evaluation are:

- What is the added commercial value of the flex energy services?
- Is the service level of the integrated flex market sufficient?
- Is the marketplace transparent and accessible for different parties?
- Is the USEF communication protocol working sufficient?

### 8.3.3 Monitoring plan

In accordance with this proposal, a monitoring plan (where is what recorded and measured and how that data is validated and recorded) an analysis plan (who performs which analyses according to which model / models) is drawn up.

The effect on flex's business case is determined by adding in those cases where Stedin would have called for the flex, these are times when flex is requested by Stedin and the flex offer fits within acceptable costs, adding the costs for Stedin to the realized revenues of the flex. flexible trading for aggregators in other markets.

Based on the flex offered, in those cases that Stedin would have actually called it, it will be settled with the registered (virtual) tax. This determines the peak reduction.

## 8.4 Commissioning Plan

Below the commissioning plan for data services (flex service) is presented. The commissioning plan for the hardware is found in Deliverables 5.3, 5.4 and 5.5

| Phase | Activity | Parties involved | Responsibility |
|---|---|---|---|
| **1 Design** | Data and market architecture | WeDriveSolar, Scholt Energy, Stedin | Scholt Energy |

| | | | |
|---|---|---|---|
| **2 Engineering** | Data connections | Scholt Energy, Stedin | Scholt Energy |
| **4 Operation** | Making flex request and offers | Scholt Energy, Stedin | Stedin |
| **6 Monitoring** | Monitoring and reporting financial effects | Scholt Energy, WeDriveSolar | WeDriveSolar |

## 8.5 Implementation plan

### 8.5.1 Planning of activities

| Phase | Activity | Planning |
|---|---|---|
| **1 Design** | Data and market architecture | 2019 |
| **2 Engineering** | Data connections | Q1 2020 |
| **4 Operation** | Making flex request and offers | 2020 – 2023 |
| **6 Monitoring** | Monitoring and reporting financial effects | 2020-2023 |

### 8.5.2 Progress achieved up to M24

For the implementation of Grid Flexibility Services, the assets need to be installed. The energy storage battery will be installed Q1 2020 meaning services will start summer 2020. Possible progress so far has been implementing the necessary data connections.

## 8.6 Conclusions

So far no conclusions can be drawn.

# 9 Measure#5: Fighting Energy Poverty

## 9.1 Specifications

Housing Corporation Bo-Ex has the ambition to contribute to improving the financial position of its tenants. A large proportion of its tenants have a relatively low income and, after deducting all fixed costs such as rent and energy, less than 100 euros per month to spend freely. The objective is to develop a data service for tenants of housing corporation Bo-Ex, which gives them control over and/or better understanding of their energy bills, resulting in reduced energy bills and increased disposable income of tenants.

***Research: scoping of the problem***

We started with research into the topic of energy use and poverty, which revealed that[3]:

- The energy consumption of households in comparable homes can vary enormously;
- The tenants have little / no insight into their energy bill because, for example, they do not understand the bill, insufficiently understanding of the Dutch language and / or have no knowledge of energy use in the home and what the influence is of their own behaviour;
- Chronic money stress leads to short-term thinking;
- Tenants consider energy use issues as a task for the housing corporation over which they cannot influence themselves;
- Tenants value personal contact and are best approached from existing structures and are sensitive to positive incentives and framing.

***Specification of the Energy Poverty Challenge***

The objective of the challenge was to 'challenge' both new and incumbent market parties to come up with innovative solutions that allow tenants of social housing with a low income to get a better grip on their energy bill. An additional requirement for the market parties was to make use of data-sets available through the City Innovation Platform in their proposed solution.

A total of 20,000 euros was available for the winning entry to further develop the idea into a scalable product or service. The winner was given the opportunity to use these resources to further develop the idea supported by the incubation program of Utrecht Inc. Bo-Ex would act as a launching customer for their product.

In May/June 2019, the challenge was widely communicated and deployed in the Utrecht network. This resulted in 5 entries. 2 entries were ineligible, 3 of which were invited to pitch their idea before a jury in July.

[3] Complete overview of used sources and finding is available in report Harmelink M, L Zanders (2019 "Evaluatie Challenge "Grip op uw Energierekening" (in Dutch available on request)

The challenge aimed for a suitable solution for tenants of social rental properties, with which they can get a better grip on their energy bill, lower their housing costs and increase their disposable income. The service must thereby meet the following conditions:

- Scalable, i.e. solution must be replicable towards other areas / cities;
- Use (open) data that is made available through the City Innovation Platform (which is based on the open FIWARE architecture);

We also asked market parties who want to propose a solution that they:

- Have demonstrable experience with open APIs, mobile applications and knowledge of data (flows)
- Must be willing to share their knowledge and have the ambition to realize national solutions.
- Have demonstrable experience with co-creation of solutions together with end users

## 9.2 Societal, user and business aspects

### 9.2.1 Citizen engagement activities

Figure 29 shows that the measure is placed at the highest level of citizen involvement in the development of the service. On the basis of various preliminary investigations into the scope of the problem and the services already available, input was collected during a workshop before setting out a challenge. Participants included parties involved in the IRIS projects and experts from the city of Utrecht working with the target group.

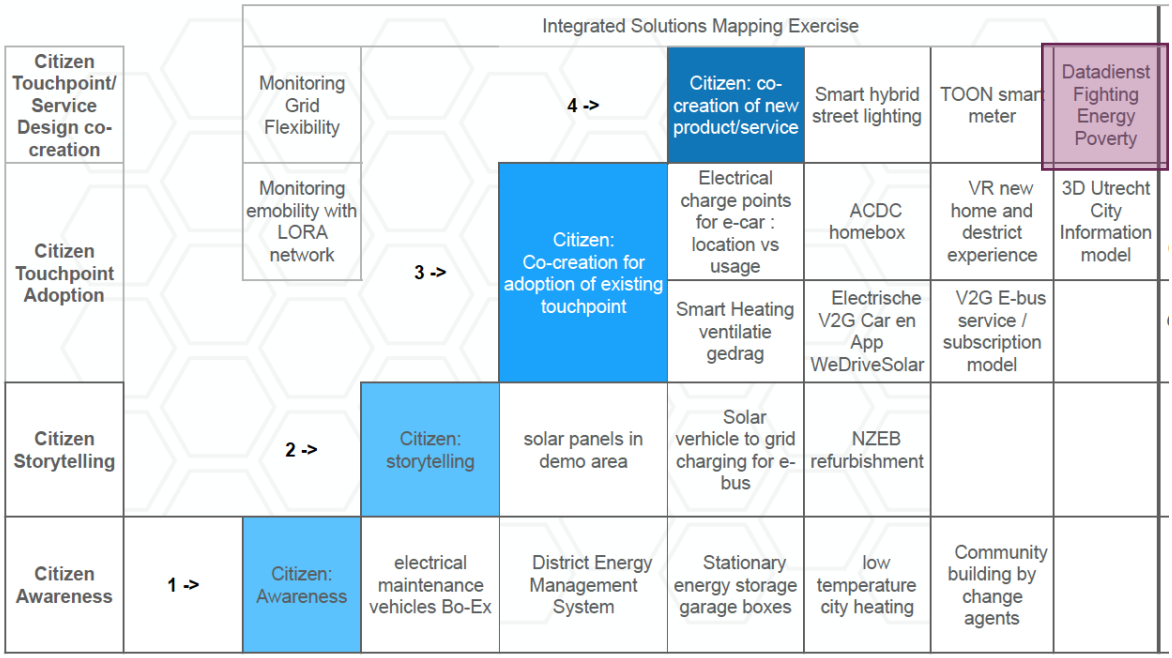



*Figure 29: Position of measure #5 in the participation ladder*

### 9.2.2 Business model

To be determined in the next step, after we have identified which services will be developed.

### 9.2.3 Governance: what is the governance model of demonstration?

Bo-ex will put out the challenge to the market and will be the launching customer for the developed data service.

## 9.3 Impact Assessment

### 9.3.1 Expected impact

Desk research and a survey done by IRIS has proven energy poverty is a serious problem in our target group, tenants of Bo-ex social housing.

Early 2019 students of Business Development & Entrepreneurship did a survey within out target group and did the following findings:

- People find it hard to talk about their energy bill
- Group that shows little / no insight into energy bill generally has a higher bill than group that does have insight into their own energy bill
- Difficulty paying energy bills is related to other financial problems (such as healthcare costs)
- MVP developed for number of personas, but could not be sufficiently tested due to lack of users
- Recommendation: start with a broader analysis of total income and expenditure of households and the role of the energy bill

Additional desk study supported these findings:

Annual report network companies:

- In 2016, 2.6% of households in the Netherlands said they had problems paying the energy bill
- In 2016, 2% of households were disadvantaged (this is the lowest in Europe)
  ECN "energy poverty" 2017
- Energy quote -% disposable income needed to pay the energy bill - increased in recent years. Around 2.6 million low-income households give on average almost 9% of their household budget on energy

Project Early identification of debts municipality of Utrecht:

- Neighborhood teams regularly come across high additional taxes due to non-transmission of meter readings
- In addition to rent, energy is the last fixed burden that people neglect

National tenant survey for kWh

- 15% sometimes have difficulty paying energy bills

### 9.3.2 KPIs

| KPI | Parameter(s) | Baseline | Target (as described in DoW or declared) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Reduced energy costs for tenants | Lower energy costs for tenants [€ / m² GFA} | Reduction in cost for energy consumption on an aggregated level, based on energy savings and current energy prices. | 20% reduction |

### 9.3.3 Monitoring plan

The monitoring will be done with the data obtained with the HEMS TOON installed in the dwellings.

## 9.4 Implementation of the measure: planning and progress

### 9.4.1 Planning of activities

A total of 20,000 euros was available for the winning entry to further develop the idea into a scalable product or service. The winner was given the opportunity to use these resources to further develop the idea supported by the incubation program of Utrecht Inc. Bo-Ex would act as a launching customer for their product.

In May/June 2019, the challenge was widely communicated and deployed in the Utrecht network. This resulted in 5 entries. 2 entries were ineligible, 3 of which were invited to pitch their idea before a jury in July.

### 9.4.2 Progress achieved up to M24

The jury was unanimous in its decisions that none of the entries was of sufficient quality and therefore none of the parties was rewarded the budget of 20,000 euros for the further development of their idea. The main shortcomings were:

- Ideas were insufficiently in line with our problem "Grip on the energy bill" for people on low incomes. Ideas on how to reach this target group were insufficiently elaborated.
- In all cases, there was a lack of solid ideas about a good business case for scaling up the service to be developed.
- Unbalanced composition of the presented project teams, which reduces the chance of successfully completing the incubation process.
- Parties who registered did not give the impression that they really had insight into the possibilities on how to use the offered datasets and develop an innovative analysis/approach based on these data.

***Lessons Learned***

We evaluated the challenge with a couple of people involved in the process. Lessons learned include:

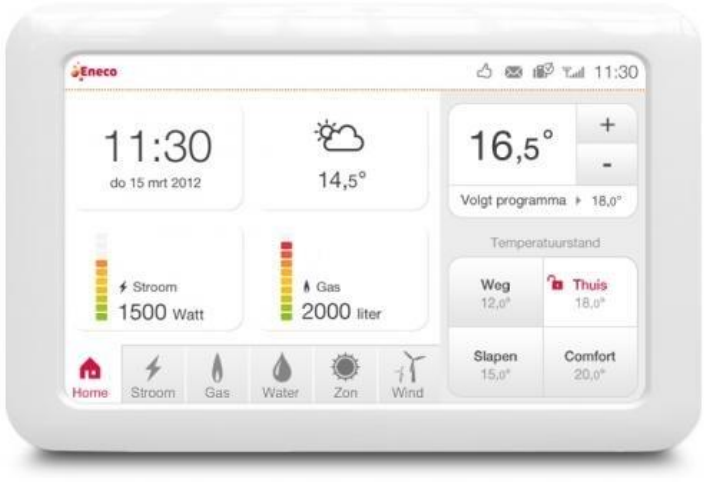
- Question: We did ask the market the right question and we were also clear about what we wanted. The requested product was a data service, but we could possibly have investigated even better whether the intended end users need a data service for this specific challenge. We might have been

able to define the problem even more clearly, which might have led to parties being able to generate a better idea.

- Network: putting the challenge out into the right network of market parties and teams is challenging. We used a large number of channels, all linking to the stakeholders involved in the IRIS project, and we also saw a peak in visits to the IRIS website. However, we do not know whether we have reached the right parties. During a previous, similar type of program (the 'Start up in Residence program' of the municipality of Utrecht) a budget was allocated to networking parties (such as start-up managers) for promoting the Start up in Residence challenges to the attention of parties. We do not have that marketing budget within IRIS.
- Requested result / product: we asked for a 'complete' product, a data service. However, experience with this kind of process shows that the price offered is too low to attract the right parties. The practical rule is 1:10: the development of an idea (a prototype) is 10% of the costs, the realization of a complete product costs a factor 10 of this.

## 9.5 Conclusions

- It seems in general useful to align the data-challenge/-development more with on-going initiatives within the IRIS partnership. This to enable the integration of the challenge results in on-going processes in a more productive way.
- We therefore decided that further development of a data-service would be linked to the implementation process of TOON. In this implementation process we are going to try to find a user group that wants to be engaged in the development of a data service (with data via TOON and complementary data via CIP).
- We furthermore concluded that instead of a challenge through a tender, it would be more effective to approach a number of parties with a good team of designers and experts (energy, behaviour, energy data) to sharpen the problem with a user group and realize a first idea (Minimum Viable Product, MVP). Followed by a second step in which a product is developed based on this MVP with a real entrepreneur, who can actually bring the product into operation. However, the question is how we can realize this second step within the IRIS project given the 1:10 rule.
- In Q1 2020 Eneco TOON is to be installed in 48 dwellings. TOON is a dashboard giving tenants real time insight into energy usage and costs. This already provides a big step into control of energy consumption and thus reducing energy poverty. Eneco has an extra data services developed that gives insight into energy spillage/leakage in the household. It tells TOON owners were energy inefficiencies and loss is happening. Based on energy usage profiles it shows stand-by losses, inefficient household equipment etc. The app doesn't give suggestions or advise what measures can be taken and what savings can be made. This is an additional data service that could be developed within IRIS project.


Eneco
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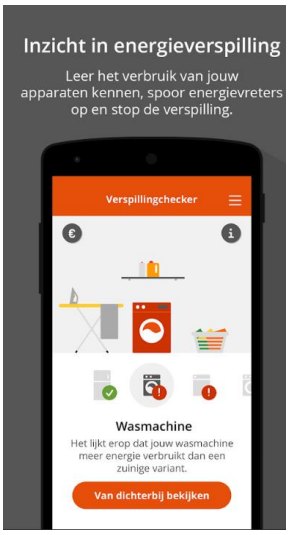
Volgt programma
18,0°
Temperatuurstand
Stroom
1500 Watt
Gas
2000 liter
Weg
12,0°
Thuis
18,0°
Slapen
15,0°
Comfort
20,0°
Home
Stroom
Gas
Water
Zon
Wind


Inzicht in energieverspilling
Leer het verbruik van jouw apparaten kennen, spoor energievreters op en stop de verspilling.
Verspillingchecker
Wasmachine
Het lijkt erop dat jouw wasmachine meer energie verbruikt dan een zuinige variant.
Van dichterbij bekijken

# 10 Ethics requirements

## 10.1 GDPR compliance

| Demonstrator | In a nutshell | |
|---|---|---|
| M#1: Monitoring e-mobility with the LoRa network | Data controller: | Civity, Last Mile Solutions, Communithings |
| | Personal Data: | Unique Charge Card ID-number |
| | High risk involved: | None (Charge Card ID-number are expelled from the charge point data set) |
| | DPIA: | None |
| | Informed Consent Procedure | None |
| M#2: Smart street lighting with multi sensoring | Data controller: | Luminext |
| | Personal Data: | Possible risk for when surveillance camera's or microphones are used |
| | High risk involved: | So far no plans to install mircophones or camera's |
| | DPIA: | none |
| | Informed Consent Procedure | none |
| M#3: 3D City Innovation Model | Data controller: | Municipality Utrecht |
| | Personal Data: | Only aggregated data is used |
| | High risk involved: | None |
| | DPIA: | None |
| | Informed Consent Procedure | None |
| M#4: Monitoring Grid Flexibility | Data controller: | WeDriveSolar, Stedin |
| | Personal Data: | No personal data |

| Demonstrator | In a nutshell | |
|---|---|---|
| | High risk involved: | None |
| | DPIA: | None |
| | Informed Consent Procedure | None |
| M#5: Fighting Energy Poverty | Data controller: | Eneco |
| | Personal Data: | Energy Metering Data |
| | High risk involved: | Data is shared with non-authorised parties |
| | DPIA: | TOON Service Conditions of Eneco allow for data to be used for additional (commercial) services. Customers can opt out for this. |
| | Informed Consent Procedure | None |

# 11 Output to other work packages

This chapter gives an of how the results of TT#4 are translated and distributed to other work packages within IRIS.

## Output to Work Package 2

The barriers and drivers identified in this deliverable as described in paragraph 3.2 can be used as direct input in the identification and analysis process in WP2, Task 1. The barriers about standardisation and protocols are needful for deliverable 2.2.

## Output to Work Package 3

The detailed descriptions of the demonstrators, as well as their ambitions, drivers and barriers developed in this deliverable will provide useful input to the development of bankable business models in WP3. Specifically measure #4 on Grid Flexibility provides interesting opportunities for replication and further business development.

## Output to Work Package 4

The detailed descriptions of the activities in Transition Track #4 of the Gothenburg interventions developed in this deliverable will provide useful input to the continued work in the implementation of the City Information Platform in Work Package 4. We see parallels in the development of the digital twin in Gothenburg and Utrecht. Close collaboration in development is advisable.

## Output to Work Packages 5 and 6

This deliverable constitutes the first detailed and coherent description of the Lighthouse City activities in Utrecht and thus may serve as a yardstick for the other LH Cities in the project to compare and assess their own activities. The collaborative work initiated for the Deliverables 5/6/7.1/2 will be continued during the implementation period of the project, and we envisage that the deliverable documents will serve as a common platform to provide information and facilitate mutual understanding between the LHC´s.

## Output to Work Package 8

The detailed descriptions of the demonstrators, as well as their ambitions, drivers and barriers developed in this deliverable will provide excellent input for setting up replication roadmap and implementation plans for LHC's and FC's. We see good opportunities for replication of measure#1 Monitoring E-Mobility, measure#4 Monitoring Grid Flexibility and, if developed further, possibly also measure #3 3D City Innovation Model.

## Output to Work Package 9

The output to Work Package 9 is limited. For D5.6 no specific KPI's have been set.

## Output to Work Package 10

The detailed descriptions of the demonstrators, as well as their ambitions, drivers and barriers developed in this deliverable will provide basis and inspiration for the dissemination and communication efforts taking place within Work Package 10. As an example we can use the webinar about V2G technolo-

gies organized by the IRIS partner WeDriveSolar. Specific communication are for instance the news item on the local channel about the smart pedestrian crossing. https://www.rtvutrecht.nl/gemist/uitzending/ustad/u-in-de-wijk-kanaleneiland/20191211-1810/ (in Dutch).

## Output to Work Package 11

The detailed and updated descriptions of the demonstrators, as well as their ambitions, drivers and barriers developed in this deliverable will allow the Steering Committee of the project to assess the current status and compare with what is stated in the DoA, ensuring that quality assurance and control aspects are covered and that appropriate mechanisms to identify, anticipate, communicate and mitigate potential risks and deviations in the project may be activated.

# 12 Conclusions and next steps

This deliverable has given an overview of the activities and progress made on the 5 measures implemented in TT#4 “CIP and information services”. In the next paragraphs the conclusions and next steps per measure are described. Not on all measures conclusion can be drawn already.

**Measure #1: Monitoring E-Moblity with LoRa network**

So far the pilot is developing successfully. Cooperation between involved IRIS project partners Municipality of Utrecht, WeDriveSolar and Civity is established, leading to task and budget assignment and planning. Also procurement of equipment (parking sensors) and cooperation with Communithings is established. The first sensors are put into place and monitoring starts further conclusions can be drawn.

**Measure #2: Smart Street Lighting with multi-sensoring**

In two co-creation workshops functional specifications for a smart pedestrian crossing have been set. Technical specification of the crossing and lamppost has been done. Early 2020 the smart street lighting and the crossing will be put into place. A second track has been opened in this measure. The municipality of Utrecht is currently facing the procurement for replacement of 60.000 lamp posts within the city. A tender will be put into the market. The municipality of Utrecht wants sensor and connectivity services to be a part of this procurement. The city aims at deriving lessons from the IRIS project to put a successful tender into the market for the 60.000 lampposts.

The measure Smart Street Lighting has started off as a solitaire pilot within the IRIS project. The specifications have been made in co-creation with the neighbourhood and the resulting smart pedestrian crossing will be implemented in summer 2020. After installation monitoring and data management can start. The city hopes to derive lessons from this first stage pilot to the city-wide tender for smart street lighting. To make this connection possible a project manager for the pilot (stage 1) and the tender (stage 2) will be assigned.

**Measure #3: 3D Utrecht City In-novation Model**

A '3D City Information Model application' for the Kanaleneiland district in Utrecht has been developed. This model is a data-based 3D representation of the district and provides insight into the energy performance in Kanaleneiland. The app “Mijn Woonwijk” was developed. The app is aimed at increasing the involvement of citizens in the changes and new projects in their neighbourhood. The app was developed and tested among a limited number of users and proven successful. The new planning regulation ‘Omgevingswet” and the development of a new Urban Planning Vision for the district offer a perfect opportunity to bring the development to a higher plan and use the model of digital twin in a real live demonstration for a participative development of the Urban Planning Vision of Kanaleneiland. A project team is assembled and the project kick off is early 2020. The project is hoped to give new insights into how data and digital solutions can give way for successful integrated participative urban planning.

**Measure#4: Monitoring Grid Flexibility**

For the implementation of Grid Flexibility Services, the assets need to be installed. The energy storage battery will be installed Q1 2020 meaning services will start summer 2020. Progress so far has been implementing the necessary data connections. So far no conclusions can be drawn.

**Measure#5: Fighting Energy Poverty**

A challenge/tender for Energy Poverty Services has been put into market. The challenge didn't deliver a satisfying solution. We evaluated the challenge with a couple of people involved in the process. Lessons learned include:

- Question: We did ask the market the right question and we were also clear about what we wanted. The requested product was a data service, but we could possibly have investigated even better whether the intended end users need a data service for this specific challenge. We might have been able to define the problem even more clearly, which might have led to parties being able to generate a better idea.
- Network: putting the challenge out into the right network of market parties and teams is challenging. We used a large number of channels, all linking to the stakeholders involved in the IRIS project, and we also saw a peak in visits to the IRIS website. However, we do not know whether we have reached the right parties. During a previous, similar type of program (the 'Start up in Residence program' of the municipality of Utrecht) a budget was allocated to networking parties (such as start-up managers) for promoting the Start up in Residence challenges to the attention of parties. We do not have that marketing budget within IRIS.
- Requested result / product: we asked for a 'complete' product, a data service. However, experience with this kind of process shows that the price offered is too low to attract the right parties. The practical rule is 1:10: the development of an idea (a prototype) is 10% of the costs, the realization of a complete product costs a factor 10 of this.

We furthermore concluded that instead of a challenge through a tender, it would be more effective to approach a number of parties with a good team of designers and experts (energy, behaviour, energy data) to sharpen the problem with a user group and realize a first idea (Minimum Viable Product, MVP). Followed by a second step in which a product is developed based on this MVP with a real entrepreneur, who can actually bring the product into operation. A different approach using the smart in home energy manager TOON (TT1) will be developed together with Eneco.

It seems in general useful to align the data-challenge/-development more with on-going initiatives within the IRIS partnership. This to enable the integration of the challenge results in on-going processes in a more productive way. We therefore decided that further development of a data-service would be linked to the implementation process of TOON. In this implementation process we are going to try to find a user group that wants to be engaged in the development of a data service (with data via TOON and complementary data via CIP).

## Recommendations

In relation to general objective of WP 5.6 several recommendations can be made:

- The integration of different IRIS solutions by integrating data streams can give way to different new services. It has been possible to integrate data into the CIP and a few services are now being developed.
- Integrating data into CIP is sometimes not so easy, but as more data flows into the platform, the added value of the platform rises.
- Once a connection is established other services can profit from that data. For instance, the charge point data is integrated for the parking sensoring measure and the same data can be used for Monitoring Grid Flexibility.

- Data services are following on the development of the measures in other WPs. This dependency makes that some of the services have had less progress than was hoped for.
- The business models of new services are not always clear, especially when there is little commercial or social value. The question who is willing to pay for the developed services, needs further investigation.