Smart city cluster collaboration

SEPTEMBER, 10TH 2014

Task 4

Overview

- Task 4 is responsible for the

> Definition of methodologies for the proposed metrics

- Task 4 consists of two (2) subtasks:
  - **Task 4.1**
    - Identify the existing methodologies for existing KPIs
  - **Task 4.2**
    - Propose the methodologies for the new KPIs

- Proposal: Use the International Performance Measurement and Verification Protocol (IPMVP) for Task 4 developments
  - Define Measurement & Verification (M&V) plans for evaluating changes performed
  - Download from: http://www.nrel.gov/docs/fy02osti/31505.pdf

- Energy goals of the projects

	DC4Cities	DOLFIN	GEYSER	GENIC	Renew IT	GreenDataNet	All4Green	CoolEm All
Run DCs in an energy adaptative mode to increase the use of RES and/or to adapt to the requests received from the SC[1]	☑	☑		☑		☑		
Explore opportunities for IT load management across DCs in response to thermal response supplies				☑				
Optimization of the energy consumption in DCs (increase of the energy efficiency)[2]	☑	☑	☑			☑		
Decrease of the environmental footprint	☑	☑	☑	☑	☑	☑	☑	☑
Use of efficient technologies in the facility: absorption chillers, etc.		☑						
Energy recovery		☑	☑					
Energy storage: batteries						☑		
Design a set of metrics that assess the success of the project	☑	☑	☑	☑	☑	☑	☑	☑
Comparison of the energy efficiency/use of RES and environmental footprint in different DC					☑	☑		

[1],[2]The approaches that will be followed in each project to achieve the goal of increasing the use of RES and to adapt to the power supply constraints of the SC are different.

- What projects need to measure

	Energy/power consumptions (load) [1]							Energy produced locally	Heat recovered/Energy reused	Power shifting	Power being federated	CO_2 emissions	Performance	
	IT	Cooling	UPS	Transformer	Lighting	Building	Total						Economic	Applications
DC4Cities	☑	☑					☑	☑		☑	☑	☑	☑	☑
DOLFIN	☑	☑	☑	☑	☑	☑	☑		☑	☑		☑	☑	☑
GEYSER	☑	☑	☑	☑	☑	☑	☑		☑			☑	☑	☑
GENIC	☑	☑					☑					☑	☑	☑
RenewIT							☑	☑	☑			☑	☑	☑
GrenData Net	☑	☑	☑	☑	☑		☑	☑	☑			☑	☑	☑
All4Green	☑						☑		☑			☑	☑	☑
CoolEmAll	☑	☑					☑					☑	☑	☑

[1,2] In some projects, as for example for RenewIT, a distinction of import/export energy within the DC as well as the measurement of the energy export directly to other buildings is required.

1. Energy/Power Consumption metrics
    1. PUE – Power Usage Effectiveness
    2. CER – Cooling Effectiveness Ratio
    3. EE – Energy Effectiveness for HVAC cooling mode in a season

2. DC Flexibility:
    1. APC – Adaptability Power Curve
    2. APCren – APC at Renewable Energies
    3. DCA – DC Adapt
    4. FER – Flexible Energy Rate
    5. MER – Managed Energy Rate
    6. MFER – Managed Flexible Energy Rate

3. DC Flexibility: Energy being federated
   1. FEW – Federated Energy Weight
   2. Federated COP
   3. Federated RES

4. Renewables Integration: Energy produced locally and renewables usage
   1. RenPercent
   2. RenEPPercent
   3. RenThermPercent
   4. RenEPThermPercent
   5. TotalEPPercent
   6. REF – Renewable Energies Factor (local RES)
   7. Grid interaction indicators

5. Energy Recovered: Heat Recovered
   1. ReusePercent
   2. ERE – Energy Reuse Effectiveness

6. Primary energy savings and CO2 avoided emissions
   1. PE savings – Primary energy savings
   2. CO2 savings – CO2 avoided emissions

7. Economic savings in energy expenses
   1. EES – Energy Expenses Savings

8. Capacity planning & management
   1. ITEE – IT Equipment Energy Efficiency

Task 4

Workplan & Main Roles

Agenda

- Task 4 Participants (initial list):
  - **DC4Cites**: ENEA, HP, Gas Natural Fenosa, Freemind
  - **DOLFIN**: UCL, I2CAT, SYNELIXIS
  - **GEYSER**: ENG, RWTH, TUC
  - **GENIC**: UTRC, Acciona, IBM
  - **RenewIT**: IREC, Loccioni, BSC, Aiguasol, Deerns
  - **GreenDataNet**: EPFL
  - **All4Green**: The All4Green project ends in April 2014, so we have to decide how to proceed
  - **CoolEmAll**: IREC, PSNC

Task 4 Main Roles:

	All4Green	CoolEmAll	DC4Cities	Dolfin	GENiC	GEYSER	GreenData Net	RenewIT
Task 4				**Leader (Synelixis)**				
Task 4.1					**Leader (UTRC/CIT)**			
Task 4.2								**Leader (IREC / Loccioni)**
Energy/Power Consumption metrics								
DC Flexibility: Power Shifting				Developer (Synelixis)				
DC Flexibility: Power being federated			Developer (ENEA)					
Energy Reused								Developer (IREC)
RES integration							Developer (EATON)	
Primary Energy Savings / Avoided CO2 emissions								
Economic Savings in Energy Expenses								
Capacity Planning/Mgmnt								

Agenda

- Task 4 duration was initially set to 3 months
  - Task 4 to complete at the end of November

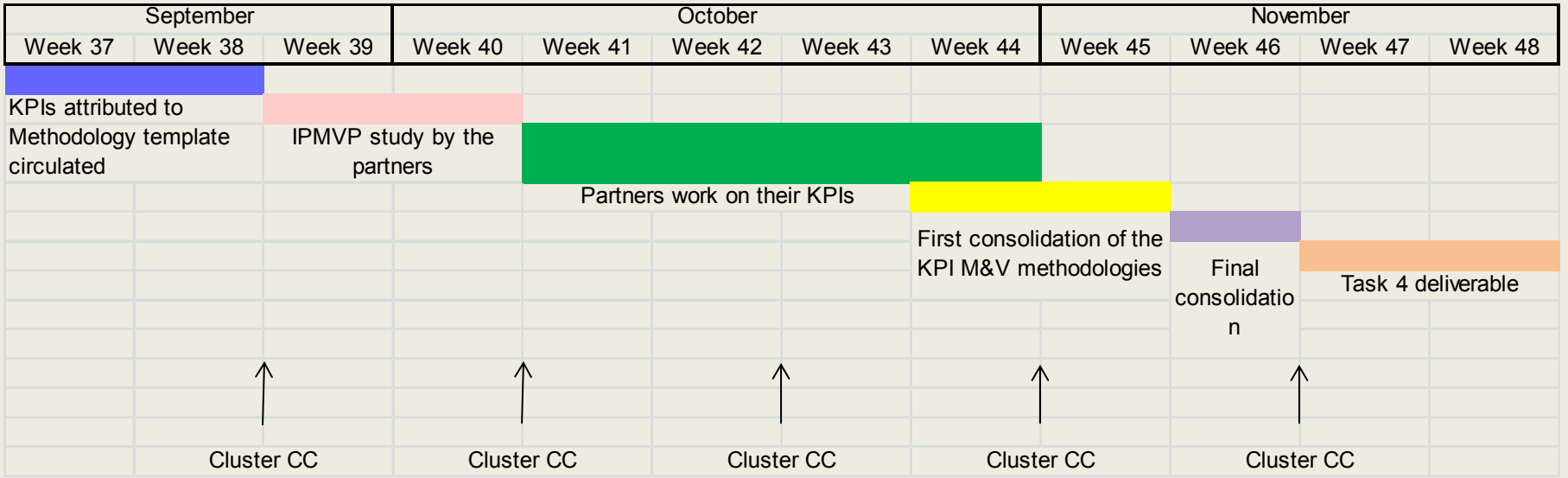
- What needs to be performed in the really near future:
  - Conclude on the developing partners and the KPI categories coordinators
  - Clarify the methodology to be applied for the measurement & evaluation plan
  - Define the methodologies
  - Agree on a common basis for the measuring equipment (?)
  - Start measuring

- The Cluster is expected to end at December 2015

Agenda

- Next steps
  - Identify the standalone parameters that need to be measured
    - Perform an initial work on them
  - Each KPI attributed to a cluster partner
    - http://doodle.com/km3sm7sawqhcsrm5
    - What happens to KPIs not attributed to anyone?
  - A template of the KPIs M&V definition description to be circulated
  - All partners involved to study the IPMVP methodology
  - All partners involved to define the methodology for their KPIs
  - Perform a first consolidation of the KPIs M&V plans
  - Perform a second consolidation of the KPIs M&V plans
  - Compile Task 4 deliverable

- Tentative timeplan



Task 4

Results to achieve

- A concrete, coherent, IPVMP compliant way of describing M&V plans for the cluster-supported KPIs
  - Any project should be able to follow the process described in the M&V plan of a KPI and come up with **directly comparable** results
  - All baseline changes should be easily applied
  - Changes in the equipment should be easily integrated into the models

Thank you