**3GPP TSG-SA5 Meeting #158 *S5-247226d2***

**Orlando, USA, 18 - 22 October 2024**

**Source: Huawei**

**Title:** **New WID on energy efficiency and energy saving aspects of 5G networks and services**

**Document for: Approval**

**Agenda Item: 6.2.1**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Energy efficiency and energy saving aspects of 5G networks and services

Acronym: Energy\_OAM\_Ph3

Unique identifier:

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  | X | X |  |
| No | X | X |  |  | X |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
|  | Study  |
| X | Normative – Stage 1 |
| X | Normative – Stage 2 |
| X | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| FS\_Energy\_OAM\_Ph3 | SA5 | 1020021 | Study on energy efficiency and energy saving aspects of 5G networks and services |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 1000033 | Stage 1 of Energy Efficiency as Service Criteria | SA1 Rel-19 Work Item  |
| 1050112 |  (WA) Energy Efficiency and Energy Saving | SA2 Rel-19 Work Item |
| 981137 | Core part: Network energy savings for NR | RAN1 Rel-19 Work Item |
| 940037 | Enhancements of EE for 5G Phase 2 | SA5 Rel-18 Work Item |

# 3 Justification

TR 28.880 addressed 11 use cases amongst which some of them potential solutions were recommended to be pursued in the normative, namely:

- Use cases #1 (Estimation of containerized VNF/VNFC energy consumption) and #2 (Alternative option to obtain energy consumption of VNF/VNFC) both address issues related to the obtention by the 3GPP management system of VM-based and containerized VNF/VNFCs energy consumption metrics from ETSI NFV MANO and have a common recommendation for the normative work, which will be addressed by WT-1;

- Use cases #3 (Enabling renewable energy consumption and carbon emission information reporting) and #4 (Exposure of carbon and renewable energy related information) address issues related to the definition of new energy related information and expose them to potential consumers; due to their strong inter-relationship, both recommendations for normative work will be addressed by WT-2;

- Use case #6 (Multi-dimensional network energy efficiency metrics) address the problem of using new performance indicators (other than data volume), in energy efficiency KPI definitions. Its related recommendation for normative work will be addressed in WT-3;

- Use case #7 (Renewable energy-based LBO) aims at considering information about the renewable energy used by gNBs during load balancing optimization. Its recommendation for normative work will be addressed in WT-4;

- Use case #9 (Renewable energy enabling 5GC NF re-selection) aims at enabling the 3GPP management system to manage and adjust the working mode of 5G NFs (e.g. turn on or turn off), which are powered by either renewable or non-renewable energy sources;

- Use case #10 (Deployment of Network Slices depending on the energy source of the operator site) addresses the possibility for a network slice customer of requesting the minimum percentage of renewable energy required for a network slice when it is deployed, gives the management system the information for taking the needed decisions to fulfil the requirement. Is recommendation for normative work will be addressed in WT-7;

- Use case #11 (Handling of power shortages) aims at enabling the 3GPP network management system, when it becomes aware of current or upcoming power shortages, to take actions (e.g. at service, network and/or resource level) to ensure the delivery of communication services such as emergency calls, first responder communication, voice calls etc. while reducing energy use.

# 4 Objective

**WT-1 Energy consumption of a NF realized by VM or OS container based VNF/VNFC**

NOTE: WT-1 groups recommendations for normative work from both use case #1 and #2, if any (to be checked during SA5#158).

**WT-1.1:** describe a new estimation method, alternative to the existing one, to estimate the Energy Consumption (EC) of VM-based VNF/VNFCs, and define corresponding KPI(s);

**WT-1.2:** extend WT-1.1 method to estimate the Energy Consumption (EC) of containerized VNF/VNFCs, and define corresponding KPI(s).

**WT-2 Energy supply, carbon emission and renewable energy information elements**

NOTE: WT-2 groups recommendations for normative work from both use case #3 and #4, if any (to be checked during SA5#158).

**WT-2.1:** specify energy supply, carbon emission and renewable energy information relative to gNBs and 5G NFs.

**WT-3 Multi-dimensional network energy efficiency metrics**

NOTE: WT-3 corresponds to use case #6 of TR 28.880.

**WT-3.1:** Pursue investigations on multi-dimensional EE metrics as per the recommendation in clause 6.6 of TR 28.880.

**WT-4 Renewable energy-based LBO**

NOTE: WT-4 corresponds to use case #7 of TR 28.880.

**WT-4.1:** Describe the use case, requirements and procedure.

**WT-4.2:** Extend the NRM to support renewable energy-based LBO.

**WT-5 Renewable energy enabling 5GC NF re-selection**

NOTE: WT-5 corresponds to use case #9 of TR 28.880.

**WT-5.1:** Describe the use case, requirements and procedure.

**WT-5.2:** Extend the NRM to support renewable energy enabling 5GC NF re-selection.

**WT-6 Provisioning of network slices depending on the energy source of the operator site**

NOTE: WT-6 corresponds to use case #10 of TR 28.880.

**WT-6.1:** Describe the use case, requirements and procedure.

**WT-6.2:** Extend the NRM to support provisioning of network slices depending on the energy source of the operator site.

**WT-7 Handling of power shortages**

NOTE: WT-7 corresponds to use case #11 of TR 28.880.

**WT-7.1:** FFS.

**WT-8 Consideration of input from other 3GPP WGs**

NOTE: this is a placeholder for consideration of input (e.g. request for alignment) from other 3GPP WGs to be addressed in Rel-19.

**TU estimates and dependencies**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Work Task ID** | **TU Estimate****(Normative)** | **RAN Dependency****(Yes/No/Maybe)**  | **SA Dependency****(Yes/No/Maybe)** | **Non-3GPP Dependency** |
| WT-1 | 0.5 | No | No | Yes (ETSI NFV) |
| WT-2 | 1 | No | Yes (SA1, SA2) | Yes (ETSI EE, ITU-T) |
| WT-3 | 0.5 | No | No | Yes (ETSI EE, NGMN, ITU-T) |
| WT-4 | 0.5 | Yes (RAN3) | No | No |
|  |  |  |  |  |
| WT-5 | 0 | No | Yes (SA2) | No |
| WT-6 | 0.5 | No | No | Yes (GSMA) |
| WT-7 | 0 | No | No | No |
| WT-8 | 0.5 | Maybe | Maybe | No |

# 5 Expected Output and Time scale

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 28.310 | Describe use case(s), requirements(s) and procedure(s) for new use cases. | Sep. 2025 (SA#109) |  |
| 28.622 | Extend NRM Stage 2 if and where needed. | Sep. 2025 (SA#109) |  |
| 28.623 | Extend NRM Stage 3 if and where needed. |  |  |
| 28.541 | Extend NRM if and where needed. | Sep. 2025 (SA#109) |  |
|  |  |  |  |
| 28.554 | Define new KPIs (if needed). | Sep. 2025 (SA#109) |  |

# 6 Work item Rapporteur(s)

# 7 Work item leadership

SA5

# 8 Aspects that involve other WGs

The following WGs address aspects related to this work item:

- SA1 and SA2 for aspects (such as e.g. definition of energy related information, carbon emission, renewable energy, etc.) described in WT-2

- RAN3 for aspects (such as e.g. consideration of renewable energy factor for enhanced LBO between gNBs) described in WT-4

- SA2 for aspects (such as e.g. 5GC selection / re-selection based on energy related information) described in WT-5.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Huawei |
| China Mobile |
| Deutsche Telekom |
| Rakuten Mobile (?) |
| Vodafone (?) |
| AsiaInfo (?) |
| CATT (?) |
| China Telecom (?) |
| China Unicom (?) |
| ZTE (?) |
| Verizon |
| Nokia |
|  |
| NEC (?) |
| Ericsson |
| PI Works (?) |
| Samsung (?) |
|  |
| AT&T (?) |
| DISH Network (?) |
| Oranges |
| Telecom Italia |