

APPENDIX

QUESTIONNAIRE FOR POLLING DISPARITY FACTORS TO REGIONAL OFFICE (OR DISTRICT) ON SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAIDI)

The study's questionnaires are divided into three categories:

- Power interruptions arisen from transmission system forced outages, or incidents,
- Power interruptions arisen from distribution system forced outages, or incidents.
- Power interruptions arisen from distribution system construction, or maintenance

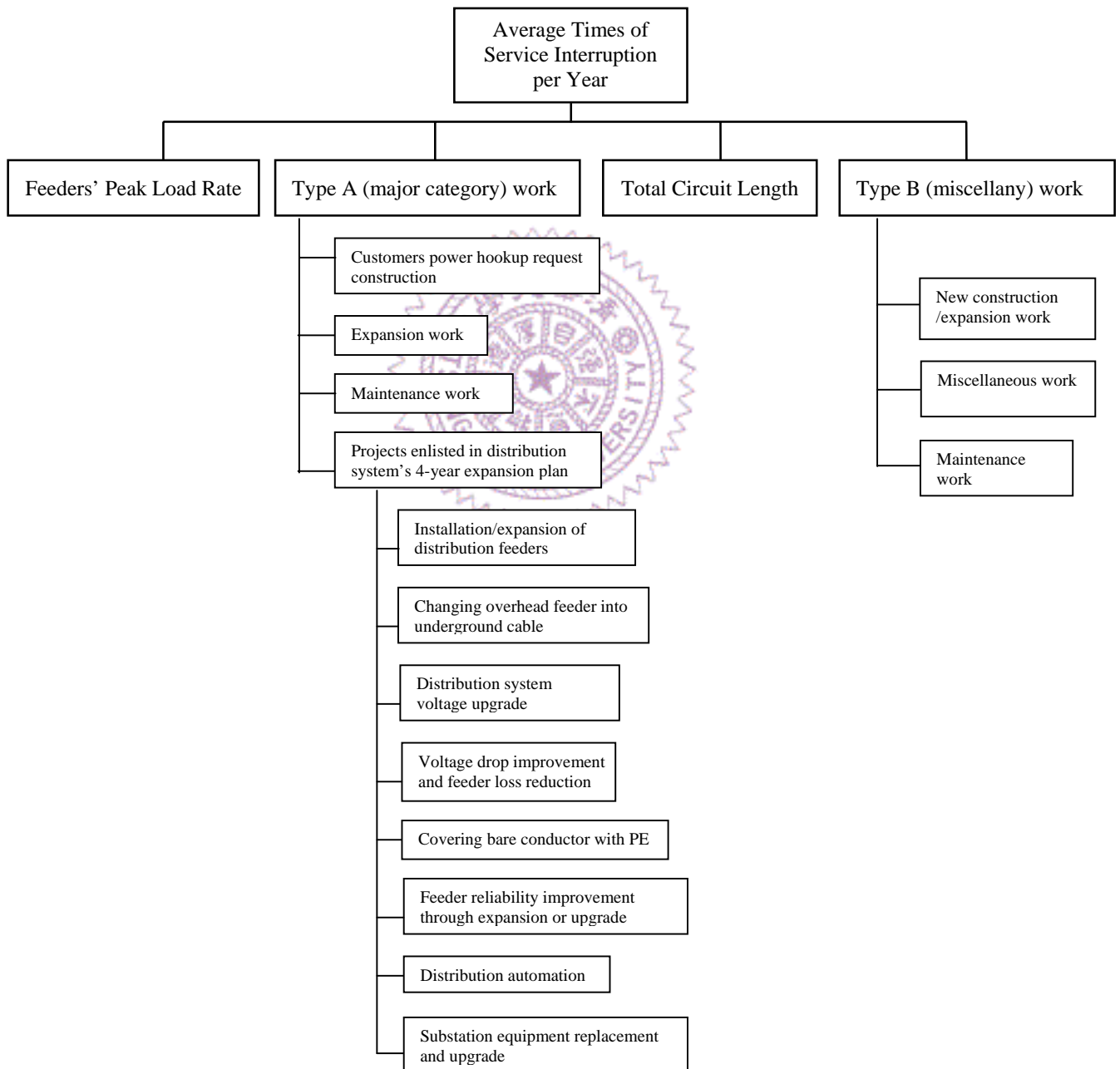
All three categories in the questionnaire are conducted by the same method of the analytic hierarchy process, which is adopted to assess the characteristic design in power transmission/distribution related forced/scheduled power interruptions. To conserve the entry, the Appendix merely enlists a comprehensive description on the service interruptions associated with the distribution scheduled outage. The distribution system's scheduled service interruption impact factors (or breakdowns) and the relative weighing figures derived from the questionnaire are shown in Table 5.8~Table 5.10.

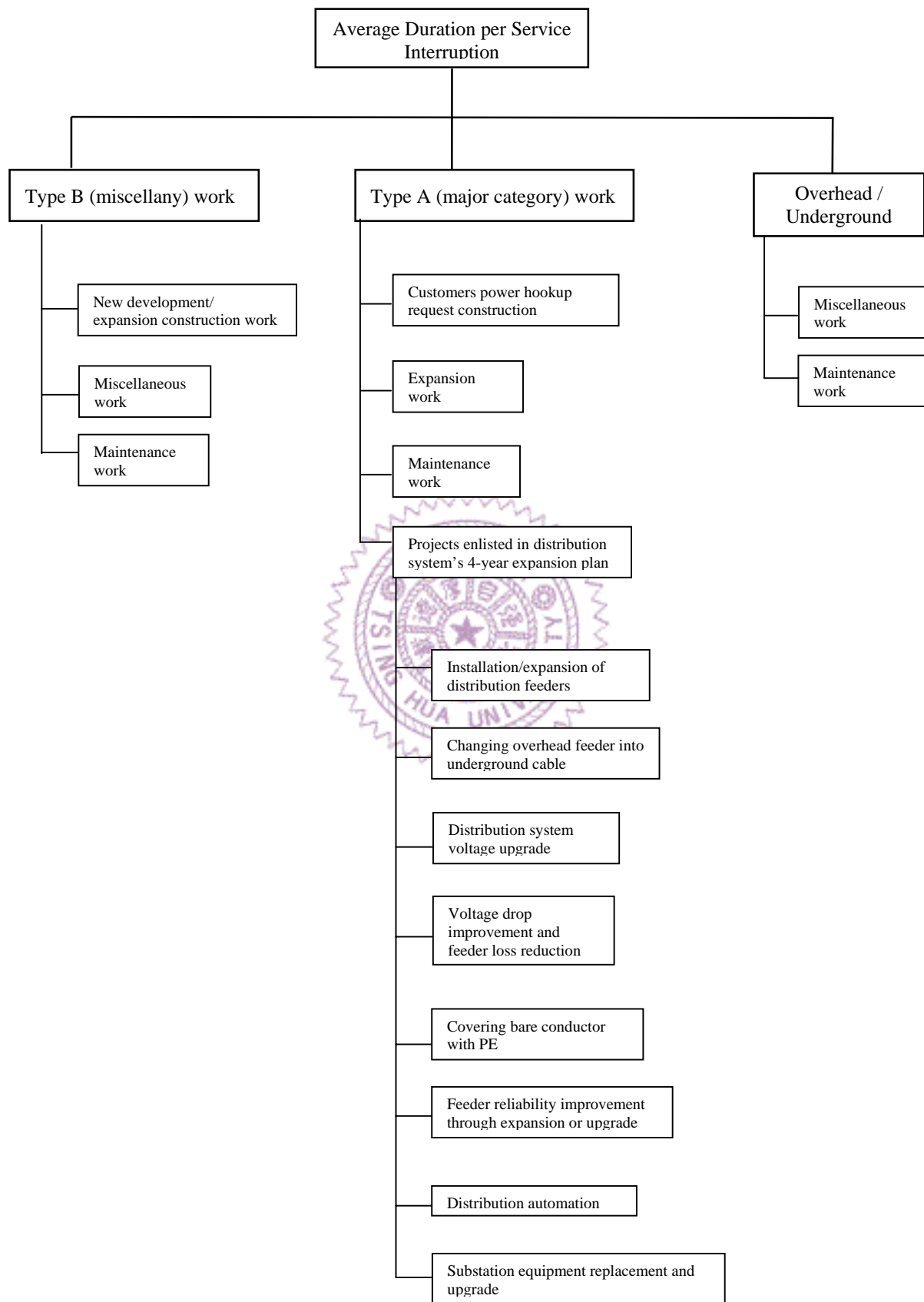
Questionnaire of Distribution Scheduled Service Interruption

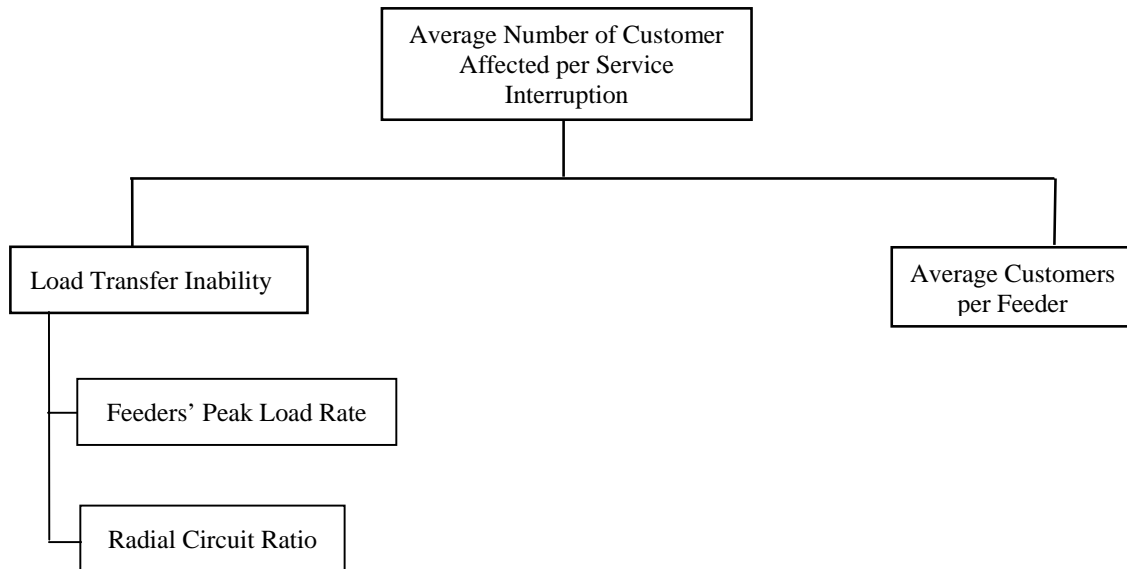
_____ District office

Position _____ Name _____

A research for assessing the disparity factor of distribution scheduled service interruption on system average interruption duration index (SAIDI) using the framework of analytic hierarchy process







District's relative weighed level = (Times of service interruption per year) X
 (Duration per service interruption) X
 (Number of customer affected per service interruption)

Framework description:

The purpose of the questionnaire lies in obtaining the relative weight among the disparity factors, while the relative propensity among the districts' objective targets are derived from the sum of multiplying the disparity factors' status values with the factor's weight. In the case of service interruption frequency, suppose the relative weight of Feeder's Peak Load Rate to service interruption frequency is at 0.25 (where upon tabulating the questionnaire findings the sum of relative impact weight among the districts' four disparity factors rated to Type A (major category) Work, Total Circuit Length, Type B (miscellany) Work, is at 1), and the relative value of a given district's feeder's peak load rate possessed the sum of all district's is at 0.075, the impact of a district's feeder's peak load rate to frequency of service interruption can be derived from multiplying 0.075 by 0.25. The relative value of the district's service interruption frequency can be obtained from adding up the sum deriving from multiplying the input status value of the four disparity factors by the disparity factor's weight individually.

Questionnaire for polling the disparity factor of distribution scheduled (working) service interruption on system average interruption duration index

First of all, we appreciate your taking the time to fill out this questionnaire.

1. The following lists major factors that affect **the frequency of scheduled service interruption**. Please choose a level of impact according to your experience by ticking an appropriate box,

	Minimal impact	Small impact	Mediocre	Large impact	Very large impact
Type A (major category) work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeder's peak load rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type B (miscellany) work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total circuit length	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid factors in a sequential order according to their impact to scheduled power interruption frequency, represented on a scale of one to four, one being one that has the most impact, and 4 being the least.

- ☐ Type A (major category) work ☐ Feeder's peak load rate
☐ Type B (miscellany) work ☐ Total circuit length

To compare the major factors in a paired manner, how do you reckon the impact of type A (major category) has to scheduled power interruption frequency versus that by feeder's peak load rate,

Minimal impact Small impact Identical Large impact Very large impact
☐ ☐ ☐ ☐ ☐

The impact that Type A (major category) work has toward scheduled power interruption frequency versus that by Type B (miscellany) construction work,

Minimal impact Small impact Identical Large impact Very large impact
☐ ☐ ☐ ☐ ☐

The impact that Type A (major category) work has toward scheduled power interruption frequency versus that by feeder total circuit length,

Minimal impact Small impact Identical Large impact Very large impact
☐ ☐ ☐ ☐ ☐

The impact that feeder's peak load rate has toward scheduled power interruption frequency versus that by Type B (miscellany) work,

Minimal impact Small impact Identical Large impact Very large impact

☐ ☐ ☐ ☐ ☐

The impact that feeder's peak load rate has toward scheduled power interruption frequency versus that by feeder total circuit length,

Minimal impact Small impact Identical Large impact Very large impact

☐ ☐ ☐ ☐ ☐

The impact that Type B (miscellany) work has toward scheduled power interruption frequency versus that by feeder total circuit length,

Minimal impact Small impact Identical Large impact Very large impact

☐ ☐ ☐ ☐ ☐

1-1 In terms of **Type A (major category) work**, which can be subdivided into the following four types, according to your experience, please tick the level of impact that it has toward scheduled power interruption frequency,

	Minimal impact	Small impact	Identical	Large impact	Very large impact
Distribution expansion plan enlisted project work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer power hookup work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansion work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid factors in a sequential order according to their impact to scheduled power interruption frequency, represented on a scale of one to four, one being one that has the most impact, and 4 being the least.

☐ Distribution system's 4-year plan enlisted project work ☐ Customer power hookup work

☐ Expansion work ☐ Maintenance work

To compare the above construction types in a paired manner, how do you reckon the impact of distribution plan enlisted project work has to scheduled power interruption frequency versus that by customer power hookup work,

Minimal impact Small impact Identical Large impact Very large impact

☐ ☐ ☐ ☐ ☐

The impact that distribution plan enlisted project work has toward scheduled power interruption frequency versus that by expansion work,

Minimal impact Small impact Identical Large impact Very large impact

☐ ☐ ☐ ☐ ☐

The impact that distribution plan enlisted project work has toward scheduled power interruption frequency versus that by maintenance work,

Minimal impact	Small impact	Identical	Large impact	Very large impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The impact that customer power hookup work has toward scheduled power interruption frequency versus that by expansion work,

Minimal impact	Small impact	Identical	Large impact	Very large impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The impact that customer power hookup work has toward scheduled power interruption frequency versus that by maintenance work,

Minimal impact	Small impact	Identical	Large impact	Very large impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The impact that expansion work has toward scheduled power interruption frequency versus that by maintenance work,

Minimal impact	Small impact	Identical	Large impact	Very large impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1-1-1 As **distribution plan enlisted project work** can be subdivided into the following eight types, please choose the necessity of power interruption by construction type by ticking an appropriate box,

	No need to adopt power interruption	Generally no need to adopt power interruption	Sometimes in need of adopting power interruption	Often in need of adopting power interruption	Must adopt power interruption
Distribution feeder installation and expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changing overhead feeder into underground cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distribution system voltage upgrade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improvements to voltage drop and reduction of line loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Covering bare conductor with PE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeder reliability improvement through expansion or upgrade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distribution automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Substation equipment replacement or upgrade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid **eight construction categories** according to sequence of scheduled power interruption frequency, on the scale of one to eight, 1 being one the most impact, and 8 being the least

- | | | |
|--|---|--|
| <input type="checkbox"/> Feeder installation and expansion | <input type="checkbox"/> Changing overhead into underground cable | <input type="checkbox"/> Voltage drop improvement, line loss reduction |
| <input type="checkbox"/> Distribution system voltage upgrade | <input type="checkbox"/> Covering conductor with PE | <input type="checkbox"/> Feeder reliability improvement through expansion or upgrade |
| <input type="checkbox"/> Distribution automation | <input type="checkbox"/> Substation equipment replacement and upgrade | |

When comparing the foresaid eight construction categories in paired manner, how do you reckon the impact of feeder's installation /expansion to changing overhead feeder into underground cable.

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare feeder's installation/expansion to improvements for voltage drop and reduction of line loss,

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare feeder's installation/expansion to distribution system's voltage upgrade,

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare the distribution feeder's installation and expansion to covering bare conductor with PE,

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare the distribution feeders' installation and expansion to the feeder reliability improvement through expansion or upgrade,

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare the distribution feeders' installation and expansion to the distribution automation,

- | | | | | |
|--|--|--|---|--|
| The frequency of power interruptions has reduced substantially | The frequency of power interruptions becomes fewer | The need for power interruption remains the same | The frequency of power interruptions remains many | The frequency of power interruptions has gone up substantially |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please compare the distribution feeders' installation and expansion to the substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to improvements for voltage drop and reduction of line loss,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to distribution system's voltage upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to covering bare conductor with PE,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the change of overhead feeder into underground cable to the feeder reliability improvement through expansion or upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the improvements in voltage drop and line loss reduction to the distribution system voltage upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the improvement in voltage drop and line loss reduction to covering bare conductor with PE,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the improvements in voltage drop and line loss reduction to the feeder reliability improvement through expansion or upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the improvements in voltage drop and line loss reduction to the distribution automation

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the improvements in voltage drop and line loss reduction to the substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the distribution system voltage upgrade to the PE cover of bare conductor,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the distribution system voltage upgrade to the feeder reliability improvement through expansion or upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the distribution system voltage upgrade to the distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the distribution system voltage upgrade to the substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to the feeder reliability improvement through expansion or upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to the distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to the substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the feeder reliability improvement through expansion or upgrade to the distribution automation

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the feeder reliability improvement through expansion or upgrade to the substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare the distribution automation to the substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

1-2 With **type B (miscellany) construction** that can be subdivided into the following three types, please choose according to your experience the level of impact towards the duration of each scheduled power interruption by ticking an appropriate box,

	Very small impact	Small impact	Mediocre	Large impact	Substantial impact
New development/ expansion work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Miscellaneous work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid construction types according to their impact to the power interruption frequency, rated on a scale of one to three, one being of the most impact, and 3 being of the least impact.

☐ New development/ expansion work ☐ Miscellaneous work

☐ Maintenance work

To compare the foresaid construction types in a paired manner, how do you reckon new development/expansion work's scheduled power interruption frequency versus that by miscellaneous works,

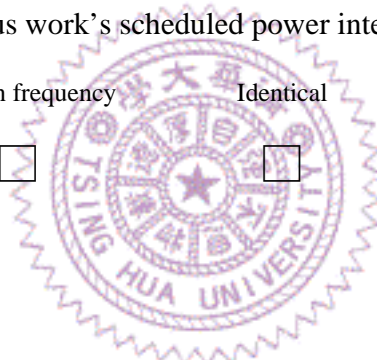
Few in frequency	Small in frequency	Identical	Large in frequency	Excessive in frequency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare new development/expansion work's scheduled power interruption frequency to that by maintenance work,

Few in frequency	Small in frequency	Identical	Large in frequency	Excessive in frequency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare miscellaneous work's scheduled power interruption frequency to that by maintenance work,

Few in frequency	Small in frequency	Identical	Large in frequency	Excessive in frequency
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



2. Below lists major factors that affect **the average service interruption duration** rated to each construction work, please choose according to your experience a level of impact by ticking an appropriate box,

	Very small impact	Small impact	Mediocre	Large impact	Substantial impact
Type A (major category) work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overhead / Underground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type B (miscellany) work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid factors according to the their impact to scheduled power interruption duration, on a scale of one to three, one being of the most impact, and three being of the least impact.

☐ Type A (major category) work ☐ Overhead / Underground

☐ Type B (miscellany) work

To compare the above factors in a paired manner, do you reckon that the impact of Type A (major category) work's scheduled power interruption duration rated to change overhead feeder into underground cable work is having,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of Type A (major category) work's scheduled power outage duration rated to Type B (miscellany) work is being,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of overhead / underground 's scheduled power interruption duration rated to Type B (miscellany) work is being,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2-1 In terms of **Type A (major category) work**, please choose according to your experience a level of impact towards the power interruption duration rated to each work for all types of work,

	Very small impact	Small impact	Mediocre	Large impact	Substantial impact
Distribution expansion plan enlisted projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer power hookup work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansion work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid construction types according to their impact to each scheduled power interruption duration, rated on a scale of one to four, where one being of the most impact, and four being of the least impact

<input type="checkbox"/> Distribution expansion plan enlisted projects	<input type="checkbox"/> Customer power hookup work
<input type="checkbox"/> Expansion work	<input type="checkbox"/> Maintenance work

To compare the foresaid construction types in a paired manner, do you reckon the impact of distribution expansion plan enlisted project's scheduled power interruption duration rated to customer power hookup work is being,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of distribution expansion plan enlisted project's scheduled power interruption duration to that by expansion work,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of distribution expansion plan enlisted project's scheduled power interruption duration to that by maintenance work,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of customer power hookup work caused scheduled power interruption duration to that by expansion work,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of customer power hookup work caused scheduled power interruption duration to that by maintenance work,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please compare the impact of expansion work's scheduled power interruption duration to that by maintenance work,

Significantly small impact	Small impact	Identical	Large impact	Significant impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2-1-1 In terms of the **eight construction categories** that fall under the distribution expansion plan, please select the length of time needed for power interruption duration rated to each construction by ticking an appropriate box,

	Power downtime being very short	Power downtime being short	Power downtime being mediocre	Power downtime being long	Power downtime being excessively long
Installation/expansion of distribution feeders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changing overhead feeder into underground cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distribution system voltage upgrade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improvement for voltage drop and line loss reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PE covering of bare conductor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Stepping up power
supply reliability
through feeder
expansion or upgrade
Distribution
automation
Substation equipment
replacement and
upgrade

☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐

Please rank the foresaid eight construction categories according to sequence of scheduled power interruption, on the scale of one to eight, 1 being of the longest in power interruption duration, and 8 being the shortest

☐ Installation/expansion of
distribution feeders

☐ Changing overhead feeder into
underground cable

☐ Voltage drop improvement, line loss reduction

☐ Distribution system
voltage upgrade

☐ Covering bare conductor with
PE

☐ Stepping up power supply reliability through
feeder expansion or upgrade

☐ Distribution automation

☐ Substation equipment
replacement and upgrade

When comparing the foresaid 8 construction categories in paired manner, how do you reckon the impact of installation/expansion of distribution feeders to changing overhead feeder into underground cable.

The frequency of power
interruptions has reduced
substantially

☐

The frequency of power
interruptions becomes
fewer

☐

The need for power
interruption remains the same

☐

The frequency of power
interruptions remains
many

☐

The frequency of power
interruptions has gone up
substantially

☐

Please compare installation/expansion of distribution feeders to improvements for voltage drop and reduction of line loss,

The frequency of power
interruptions has reduced
substantially

☐

The frequency of power
interruptions becomes
fewer

☐

The need for power
interruption remains the same

☐

The frequency of power
interruptions remains
many

☐

The frequency of power
interruptions has gone up
substantially

☐

Please compare installation/expansion of distribution feeders to distribution system's voltage upgrade,

The frequency of power
interruptions has reduced
substantially

☐

The frequency of power
interruptions becomes
fewer

☐

The need for power
interruption remains the same

☐

The frequency of power
interruptions remains
many

☐

The frequency of power
interruptions has gone up
substantially

☐

Please compare installation/expansion of distribution feeders to covering bare conductor with PE,

The frequency of power
interruptions has reduced
substantially

☐

The frequency of power
interruptions becomes
fewer

☐

The need for power
interruption remains the same

☐

The frequency of power
interruptions remains
many

☐

The frequency of power
interruptions has gone up
substantially

☐

Please compare installation/expansion of distribution feeders to stepping up power supply reliability through expansion or improvement,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare installation/expansion of distribution feeders to distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare installation/expansion of distribution feeders to substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to improvements for voltage drop and reduction of line loss,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to distribution system voltage upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to covering bare conductor with PE

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to stepping up power supply reliability through line expansion or improvement,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare changing overhead feeder into underground cable to substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare voltage drop improvement and line loss reduction to distribution system voltage upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare voltage drop improvement and line loss reduction to covering bare conductor with PE

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare voltage drop improvement and line loss reduction to stepping up power supply reliability through feeder expansion or improvement,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare voltage drop improvement and line loss reduction to distribution automation

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare voltage drop improvement and line loss reduction to substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare distribution system voltage upgrade to covering bare conductor with PE,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare distribution system voltage upgrade to stepping up power supply reliability through feeder expansion or improvement,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare distribution system voltage upgrade to distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare distribution system voltage upgrade to substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to stepping up power supply reliability through feeder expansion or improvement,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to distribution automation,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare covering bare conductor with PE to substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare stepping up power supply reliability through feeder expansion or improvement to distribution automation

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare stepping up power supply reliability through feeder expansion or improvement to substation equipment replacement and upgrade,

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

Please compare distribution automation to substation equipment replacement and upgrade

The frequency of power interruptions has reduced substantially

☐

The frequency of power interruptions becomes fewer

☐

The need for power interruption remains the same

☐

The frequency of power interruptions remains many

☐

The frequency of power interruptions has gone up substantially

☐

2-2 As the average scheduled power interruption duration in **overhead feeder and underground cable** may vary (being that the underground cables may take longer), and given similar types of work, in which the average power interruption duration being 10 minute in overhead feeder work, what do you reckon that the average

scheduled power interruption caused by underground cable work should take how many minutes: _____.

To compare the impact factors in a paired manner, do you reckon the scheduled power interruption duration for overhead feeder versus that for underground cable to be,

Significantly shorter ☐ Shorter ☐ The same ☐ Longer ☐ Significantly longer ☐

2-3 In terms of **Type B (miscellaneous) work**, please choose according to your experience a level of impact towards the power interruption duration rated by each construction for all types of construction work

	Minimal impact	Small impact	Mediocre	Large impact	Very large impact
New development / expansion work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Miscellaneous work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the foresaid construction types by their impact toward each scheduled power interruption duration in a sequential order on a scale of one to there, where one being the most impact and 3 being the least.

☐ new development /expansion work ☐ miscellaneous work
☐ maintenance work

To compare the foresaid construction types in a paired manner, do you reckon the scheduled power interruption duration of new development/expansion work to miscellaneous work as being,

Significantly shorter ☐ Shorter ☐ The same ☐ Longer ☐ Significantly longer ☐

The impact that new development/expansion work has toward scheduled power interruption duration versus that by maintenance work,

Significantly shorter ☐ Shorter ☐ The same ☐ Longer ☐ Significantly longer ☐

The impact that miscellaneous work has toward scheduled power interruption duration versus that by maintenance work,

Significantly shorter ☐ Shorter ☐ The same ☐ Longer ☐ Significantly longer ☐

3. Followings being the key factors that affect the **average customer affected per service interruption**, please rank their impact level by ticking an appropriate box according to your experience,

	Very small impact	Small impact	Mediocre	Large impact	Very large impact
Load transfer capability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Average customer per feeder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the above factors according to their impact to each scheduled power interruption customer count in a sequential order on a scale of 1 to 2, 1 being most impact, and 2 being least.

☐ Load transfer capabilities

☐ Average customer per feeder

Please compare the foresaid impact factors in a paired manner, how you reckon the impact of load transfer capability toward scheduled power interruption customer count versus that by average customer per feeder,

Significantly smaller impact	Small impact	Identical	Large impact	Significant more impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3-1 As **load transfer capability** is related to the following factors, please tick an appropriate box that best indicates the correlation between the factors and the load transfer capabilities,

	Insignificant correlation	Small correlation	Mediocre	Largely correlated	Very largely correlated
Radial circuit ratio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeder's peak load rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank the relevancy of the foresaid factors in a sequential order, rated by feeder load transfer capacities, which are represented by 1 and 2, where 1 being the highest correlation and 2 being the smaller of the two.

☐ Radial circuit ratio

☐ Feeder's peak load rate

To compare the above two factors, in your opinion the impact of the ratio of radial feeders when rated to the feeder's peak load rate is,

Minimized impact	Little impact	Identical	Substantial impact	Significantly greater impact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

We thank you once again for taking your precious time to fill out this questionnaire. Your efforts are highly regarded for the tangible contribution made towards Taipower's cutting down customer's service interruption durations.