

RADONORM SURVEY

SCK CEN

TECHNICAL REPORT
IRELAND

Job number 221116

12/10/2023 (FINAL)



SCK CEN – Radonorm survey Ireland – (Ref number 221116)

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1. INTRODUCTION

SCK CEN regularly conducts large-scale opinion polls into themes related to radiation protection and nuclear energy. In the context of the H2020 RadoNorm project (www.radonorm.eu), SCK CEN is responsible for conducting a survey on perceptions and behaviors regarding the indoor air pollutant radon, with a representative sample of the Ireland adult population.

SCK CEN has contacted Kantar to carry out the survey in Ireland by using computer-assisted web interviewing (CAWI) from a panel sample, representative with stratification in terms of the total number of inhabitants on gender, age and region (objective: n=1.000).

Kantar can present a very large experience in social science projects, in particular in the field of research commissioned by governments and university research groups.

Thanks to the studies conducted previously, we developed the capabilities and skills to meet all the requirements of such projects. Moreover, the process that is followed with each project is continuously re-evaluated and adjusted where necessary, and builds on:

- A team of employees with relevant scientific training (economics, commercial engineering, sociology, psychology, ...) and extensive experience in data collection and methodology. All Kantar employees who are responsible for the overall supervision of the project, the execution of the data collection, the data input, the data processing and the informatics, were also involved in several of these previously conducted studies.
- A team of field supervisors with a long experience in the organization and follow-up of large and complex data collection projects. Especially when it comes to projects that consist of different phases with a combination of different methods, the team has built up a strong reputation.

The following persons have been involved in the implementation of the survey in Ireland:

General supervision and guidance of the project:

Bernard SCHERAY, Project manager

Role: project management, he will ensure that all questions from the client are answered in a timely and correct manner.

Supervision of the project:

Jan-Jaap de Vlieger: Research Manager

Role: Project Manager for Kantar, responsible for internal coordination, control of the programmed questionnaire, control of data processing, cleaning,...

Data collection responsible:

An JANSSENS, Field Manager, supervision of the fieldwork

Role: An is responsible for the planning, timing, coordination and follow-up of the fieldwork

Mario LANOYE, Data Collection Director operations.

Role: general supervision of the fieldwork

Data processing and scripting:

Rinaldo Boets: Manager Data Processing and Data Analyse

Role: General coordination of data processing and analyses

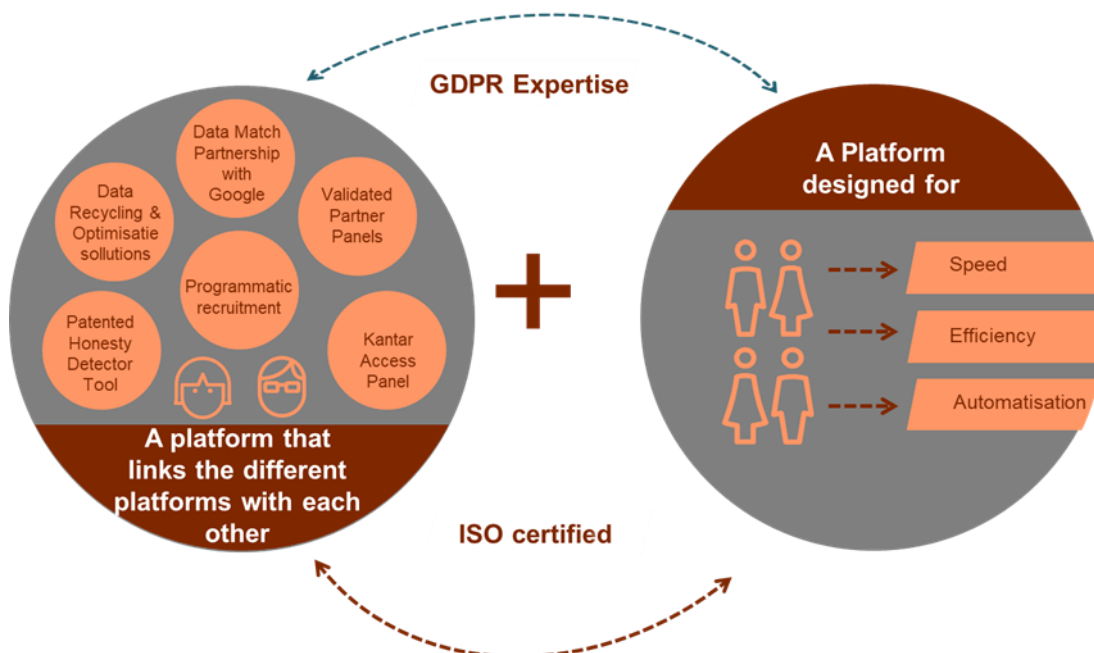
Jorn VAN DE MAELE: Senior Scriptor

Role: Supervision and execution scripting

2. THE PANEL

For the recruitment of the online sample, Kantar has used Kantar's existing Profiles Network. The Kantar Profiles network is built on strictly validated respondents (384.207 unique responders in Ireland), sourced in a variety of ways (blended). The panel is fully permission based and data is collected in a GDPR compliant manner.

Via the Kantar Profiles Network and One Platform, Kantar has simplified and streamlined the research process. The One Platform set controls on key variables and select sample based on stored profile characteristics of Kantars LifePoints panel and integrated panels of suppliers. During the fieldwork, we closely monitored additional invites based on response rates and specified quotas. Typically, response rates are around 35% - in other words, approx. 3 times as many respondents as the number of completes required are invited to participate.



For their participation, respondents receive a small incentive mostly in the form of points that can be used to save up for e.g. retail vouchers.

The advantages of this panel are:

- A fully representative and controlled sample of the target group:
 - offline recruitment (limitation of the number of heavy internet users)
 - low contact frequency (large panel)
 - limited use of incentives (no professional respondents)
 - online control tool for the control of the sample quota (less weighting)
- A high degree of cooperation and response thanks to the management of the panel
- High quality data thanks to the quality checks carried out
- Unique participation of the respondents per project
- Suitable for different types of research: short and long questionnaires, representative and specialized samples, suitable for complex or sensitive topics

To ensure high quality of the fieldwork and identify fraudulent respondents, Kantar invests significantly in the development and technology of our unique and proprietary quality and verification tools. They include a series of real-time checkpoints that new panel registrants pass through while completing the panel registration survey, as well as when they enter a new survey. Registrants who fail these checks are unable to join our panels and cannot participate in surveys. Kantar's verification survey-entry and registration checkpoints include:

- Proxy Detection: Detects a proxy server used to mask the registrant's true IP address and past fraudulent activity
- IP GeoFencing: Locates the registrant's country location via his/her IP address and determine his/her eligibility for registration based on country-specific rules
- Email Address Verification: Queries our database to ensure the email address is unique (all registrants must verify their email addresses through a double opt-in registration process)
- Digital Finger Printing: Detects duplicate respondent entries within a single survey and blocks his/her entry
- Honesty Detector: Patented pre-survey technology that identifies over-reporters and blocks them from entering a survey upon failure

3. QUESTIONNAIRE AND SCRIPTING

3.1. QUESTIONNAIRE

The draft questionnaire was provided by SCK CEN at the start of the study and subsequently lightly adapted to take into account the fieldwork method and several suggestions for optimisation. The final draft version was scripted, followed by several rounds of online testing by both SCK CEN and Kantar. After fixing the shortcomings identified, the final scripted version was approved to enter the fieldwork stage.

The final scripted questionnaire was sent to a limited number of respondents ('Soft launch') for a real-life test of the questionnaire. The fieldwork itself and the data analysis did not reveal any shortcomings, and thus in the end the same questionnaire was provided to all respondents. An exception are questions PA1-PA4 which were only added after completion of the soft launch at the request of SCK CEN. Consequently, the results for these 4 questions have been answered by approx. 90% of the sample.

To capture where respondents live, they were asked to provide the first 3 characters of their postal code (EIRCODE). There are approx. 150 3-character Eircodes in Ireland. The codes can be assigned to counties which in turn can be assigned to the provinces (which were used as a variable in weighting the data to increase sample representativeness).

At the end of the questionnaire, respondents were offered the opportunity to submit their feedback or questions to the research team. In Ireland, no feedback or questions were received.

The final questionnaire has been included in the annex.

3.2. SCRIPTING

The scripting was conducted using Nipo Nfield Online, specialised software for survey scripting and sample management developed by KANTAR TNS NIPO. The Nfield Online template is suited to accommodating a wide range of question types and has been primed to deliver perfect presentation of survey questions on every smartphone, tablet and desktop screen.

Nfield is a fully cloud based data collection solution for online and mobile surveys, and has all functions you need to conduct high quality surveys that boost response rates, Nfield Online offers these benefits:

- Complex questionnaire capabilities
- Support for Interlinked quotas and monitoring
- Integrated invitation management (emailing)
- Configurable result codes, exit links and buttons
- Respondent data management
- Ability to manage who may take a survey

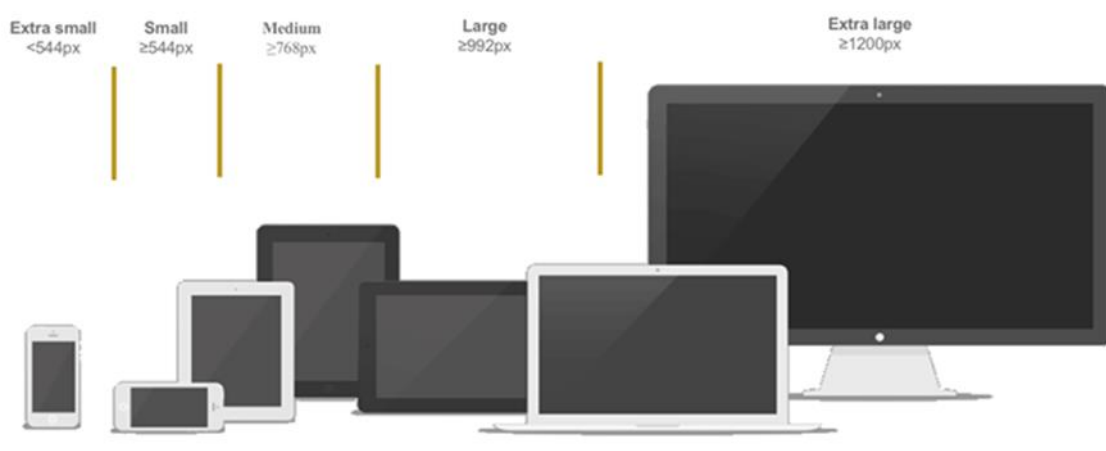
NField is ISO27001 certified (data security) and GDPR compliant.

In particular, for this survey we used the latest Nfield V3 programming software. The new programming software is highly committed to 'modern & intelligent survey design'. Intelligent design means that the layout of the questions is adapted to both the content and the device

on which the questionnaire is answered. An app-like tool was developed that allows the scripter to program approximately 95% of the questions immediately out of the box based on existing templates, without the need for additional customization. This not only saves valuable scripting time, but also automatically evaluates the question content and determines the most optimal format for delivery according to the device used by the respondent.

The system uses the input (description of the question) from the scripters and checks the word count and word length of questions and answers. Based on this, the most appropriate design is chosen from a library of 250+ design styles (templates) and +/- 100 rules around 'best practice' of question presentation.

Nfield empowers Kantar to create highly professional and attractive online surveys for smartphone, tablet, and desktop screens, with five different layout breakpoints being available.



Nfield has a responsive design and adapts content to fit the available space, adjusting the positioning of question text and answers, the space between them, and the font sizes.

4. SAMLING AND FIELDWORK

4.1. SAMPLING

From the online panels, Kantar has drawn an as representative as possible sample based on gender, age and region considering the expected response rate per socio demographic criteria. Additional sample was added for those demographic criteria that lagged behind. In other words, this is a dynamic sampling process that aims at filling the set sample quota to the best possible extent within the possibilities of the panels used.

The objective for sampling was to arrive at a representative sample for the population of Ireland of 18+ years old by age, gender and region. This comprises 3,898,611 individuals (2022, source: Eurostat). The number of invites sent out is included in the next paragraph.

4.2. FIELDWORK

Fieldwork was started as soon as the final questionnaire had been scripted and tested. The fieldwork was completed after 1,102 responses had been obtained:

n=113 from the soft launch (fieldwork period: January 13-17, 2023)

n=989 from the main launch (fieldwork period: January 30 – February 9, 2023)

The composition of the (uncleaned) sample of the soft launch (n=113) and of the soft+main launch combined (n=1,102) are included in the table at the end of this chapter.

To arrive at the total of 1,102 completed surveys, a total of 6,639 invites were sent out (response rate: 17%). Of the 6,639 invites,

- 1,532 started the survey
- 5,107 never opened the link (no response)

Of those that started the survey (n=1,532), 1,102 completed the survey, 363 dropped out during the survey, 22 did not make it past the screening questions as the set quota were full, and 45 were screened out as they did not meet the screening criteria.

5. DATA CLEANING, WEIGHTING AND DELIVERY

5.1. CLEANING

To ensure a high-quality final sample, approx. n=100 respondents were removed (“cleaned”) from the sample of n=1,102 to arrive at the final sample of n=1,003. The cleaning involved hallmarking several questionnaire and fieldwork variables as criteria that were deemed to give an indication of a respondent’s (lack of) dedication in filling out the questionnaire:

- Total duration (whereby an unrealistically short duration is not considered credible)
- Number of questions answered with “don’t know” (whereby a very large number of “don’t knows” is not considered credible)
- Correctly answering to a number of statements that were hidden in item batteries (the instruction was to provide a certain answer, e.g. “agree” to that statement; a respondent that is not paying attention is more likely to miss that instruction).
 - o Question RA12_2: *For this statement please indicate ""Agree"". This is a control question.*
 - o Question RA23_8: *For this statement please indicate ""Strongly disagree"". This is a control question.*
- Providing conflicting answers to opposing statements, and in particular, if these were simultaneously agreed or disagreed with, for the following pairs of questions:
 - o RA17_1 and RA17_2 (2 somewhat similar items on a 5-point agreement scale):
 - RA17_1: *Home remediation, if needed, offers effective protection against radon hazards.*
 - RA17_2: *Home remediation, if needed, will fail to protect from high radon concentrations.*
 - o RA17_3 and RA17_4 (2 somewhat similar items on a 5-point agreement scale):
 - RA17_3: *A special installation would eliminate the radon hazard if needed.*
 - RA17_4: *A special installation can NOT reduce radon to a safe level in homes that have a radon problem.*
 - o RA23_1 and RA23 (2 somewhat similar items on a 5-point agreement scale):
 - RA23_1: *I believe reducing radon in my home would require more resources than I have.*
 - RA23_3: *I believe that the cost for remediation of my home to reduce the indoor radon concentration is low.*
 - o E5 and E6 (2 somewhat similar items on a 5-point agreement scale):
 - E5: *Other people’s misfortunes do not usually disturb me a great deal.*
 - E6: *I am often quite touched by things that I see happen.*
- Straightlining / giving (or rather: not giving) rather similar answers to several consecutive questionnaire items for which high (or: limited) variance in the answers is expected:
 - o RA22_1 and RA22_2 and RA22_3 (3 somewhat similar items on a 5-point agreement scale):
 - RA22_1: *I can always manage to solve difficult problems if I try hard enough.*
 - RA22_2: *I can solve most problems if I invest the necessary effort.*
 - RA22_3: *When I am confronted with a problem, I can usually find solutions.*
 - o IMN_1 and IMN_2 and IMN_3 (3 somewhat similar items on a 5-point agreement scale):
 - IMN_1: *I think people in my community would consider testing for indoor radon a moral obligation.*
 - IMN_2: *I think others consider radon testing and remediation as a civic duty.*

- IMN_3: *I think people in my community regard taking action against radon as morally right.*
- E1 – E8 (8 different items on a 5-point agreement scale, to which relatively high variance is expected in the answers – else straightlining could potentially be an issue):
 - E1: *I often have tender, concerned feelings for people who are less fortunate than I.*
 - E2: *I sometimes find it difficult to see things from another person's point of view.*
 - E3: *Sometimes I don't have much compassion for other people when they have problems.*
 - E4: *I try to look at everybody's side of a disagreement before I make a decision.*
 - E5: *Other people's misfortunes do not usually disturb me a great deal.*
 - E6: *I am often quite touched by things that I see happen.*
 - E7: *I believe there are two sides to every question and try to look at them both.*
 - E8: *Before criticizing somebody, I try to imagine how I would feel if I were in their place.*

The cleaning was based on a certain threshold for acceptable probability that has to met for a respondent's input to be considered of sufficiently high quality overall. The actual probability of each respondent is based on the above-mentioned criteria, whereby probabilities per criterium are multiplied to arrive at a final score.

The dashboard to manage the levels is included here as a screenshot.

[illegible]

For example, the overall threshold might be placed at 15% (as is the case here), and the probability of a valid questionnaire with extreme low duration placed at 30% and the probability of a valid questionnaire in case of many don't knows at 40%. When failing on only 1 criterium, the respondent passes (as both 30% and 40% are each higher than 15%). But if a respondent fails on both criteria simultaneously, the chance of a valid questionnaire is 30% times 40% = 12% and the respondents is removed from the sample, as 12% is lower than the 15% threshold. Depending on the thresholds and the respondent answers to the various questions, an overall probability score of each individual respondent is determined and compared to the threshold. This results in part of the sample being deleted from the final (cleaned) sample.

The composition of the sample after cleaning is included in the table at the end of this chapter.

5.2. WEIGHTING

No sample is 100% representative of the intended population, partly because of the more difficult accessibility and degree of cooperation of a number of population groups. Therefore, the obtained net samples were optimised by re-weighting it according to the socio demographic criteria in each country. The criteria applied are included in the table at the end of this chapter (in Ireland: gender, age and province).

Kantar uses an iterative procedure for the weighting, whereby it is possible to weight on a reasonably large number of variables simultaneously. In successive iteration strokes, weights are re-weighted several times on all weighting categories until an optimal fit is achieved. At the end of the process, the program provides the distributions of the criteria and the distribution of the assigned weights. For this study, the smallest factor applied was 0.72 and the largest factor applied was 1.97. The distribution of the weights is as follows:

- 0.7 – 0.8: 25%
- 0.8 – 0.9: 30%
- 0.9 – 1.1: 27%
- 1.1 – 1.7: 12%
- 1.7 – 2.0: 7%

The individual weighting factor of each respondent has been added to the output (SPSS) file.

The composition of the net (cleaned) sample after weighting is included in the table below (see last column). This column forms the basis for reporting on all survey findings.

Variable	Soft launch	Gross sample (before cleaning)	Net sample (after cleaning)	Weighting objective (universe*)	Weighted net sample
Completes (n=...)	113	1,102	1,003	-	1,003
Gender					
- Male	50%	47%	45%	49%	49%
- Female	50%	53%	54%	51%	51%
- Other/NA	0%	1%	1%	1%	1%
Age					
- 18-29	10%	22%	20%	19%	19%
- 30-44	42%	32%	32%	28%	28%
- 45-59	36%	32%	33%	26%	26%
- 60+	12%	14%	15%	27%	27%
Province					
- Connacht / Ulster	22%	17%	17%	18%	18%
- Dublin	26%	30%	29%	28%	28%
- Munster	31%	24%	24%	27%	27%
- Rest of Leinster	21%	29%	29%	27%	27%
Duration (average min:sec)	20:44	19:46	20:43	-	-

* source: based on Eurostat (2022)

5.3. DATA DELIVERY

The resulting survey data was provided to SCK CEN in the form of 2 SPSS data files:

- One file containing the data of the uncleaned sample (n=1,102)
- One file containing only the data of the retained respondents (n=1,003)

6. ANNEX – QUESTIONNAIRE

Dear Participant,

This research seeks to chart the attitudes, beliefs and perception in society related to health behaviour in the context of the European research project RadoNorm.

The survey is anonymous and voluntary. Your name will not appear or be used in any stage of data collection or analysis. You may refuse to answer any question or withdraw at any stage. The information you provide will be used only for this survey and will be held anonymously and confidentially. In keeping with the General Data Protection Regulation (GDPR) all participant data will be destroyed as soon as analysis of the data is complete.

Please read the following statements before consenting to participate in the survey.

- I have read and understood the information above.
- I understand what the project is about, and what the results will be used for.
- I know that my participation is voluntary and that I can withdraw from the project at any stage without giving any reason.
- I am aware that my information and answers will be kept confidential.

Having read the information above, do you consent to participate in this survey?

- Yes I consent
- No I do not consent → Stop interview

VIDEO TEST:

VIDEO1

In this research one or more sound and / or video fragments are shown. We would like to show you a short video. Please, turn on your sound and watch it.

Show test-video (respondent to start the video, no autoplay), after video auto continue

VIDEO2

Can you indicate what applies to you?

- I heard the sound and watched the video play → go to INTRO
- I only heard sound → go to next question
- I just saw the video playing → go to next question
- I did not hear any sound and did not see the video playing → go to next question

VIDEO3

Please check and make sure you can both see and hear videos on your device, and try again.

Show test-video (respondent to start the video, no autoplay), after video auto continue

VIDEO4

Can you indicate what applies to you?

- I heard the sound and watched the video play → go to INTRO
- I only heard sound → stop interview
- I just saw the video playing → stop interview
- I did not hear any sound and did not see the video playing → stop interview

INTRO:

First we want to ask some questions about you.

S2	What best describes your gender?	1. Male 2. Female 3. Other 4. I prefer not to say
S3	What is your place of residence? Please provide the first three characters of your EIRCODE and make a selection. In case you do not know your EIRCODE, please start by typing the name of your town. If you cannot find your Eircode or do not know it, please select "Other" and provide your Eircode (first 3 characters only) or your place of residence. [Eircode] Allow both numbers and letters Use list (to be provided)
S4	What year were you born in? Sample 18+: Max. answer is 2005 [year]
S5	What is the highest level of education/training you have obtained?	1. less than a second level certificate such as leaving certificate 2. A second level certificate such as a Leaving Certificate or equivalent 3. Bachelor degree 4. Master degree 5. Doctorate 9. Not applicable
S7	How many people are currently living in your household (including yourself)? Children living in student accommodation who come home during the weekend also count as a household member. Must be Min. 1 and Max. 10	
S8	And how many of those are children younger than 18? Filter on S7: skip if S7 = 1. If S7>1: must be max. S7-1 (always assume at least 1 adult in each household)	
S10	Is the dwelling that you spend most of your time a property of yours or your family, or does it belong to someone else?	1. I am owner or co-owner 2. It is the property of another family member 3. It is the property of someone else 9. Don't know/Not applicable
S11	For how long have you been living in this dwelling?	1. 1 year or less 2. More than one year : (Indicate in years)

DWEL1	In approximately which year was the dwelling you live in built? <i>Max. answer depends on S11: max=2023-(S11) where S11 = 1 for code 1</i>	... [year] 9. I don't know
DWEL2	<i>For surveys conducted in 2023: filter on DWL1=2012 or less (DWEL1 is older than 10 years):</i> Was the dwelling renovated for energy-saving purposes (e.g. insulation, windows, ...)?	1. Yes 2. No 9. I don't know/Not applicable
DWEL3	In what type of dwelling do you live?	1. Studio/Apartment 2. Detached House 3. Semi-detached House 4. Terraced House 5. Other
DWEL4	Is the ground floor or basement in your dwelling used as a living space?	1. Yes 2. No 9. I don't know/Not applicable

To what extent do you agree or disagree with the following statements?

PA1	My home is a really special place to me	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/NA
PA2	There are other places which I can compare to my home	
PA3	I don't identify strongly with my home	
PA4	I am ready to invest my heart and soul into my home	

SMOKE	Do you or does someone else in your house smoke indoors?	1. Yes 2. No 9. Not applicable
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INTRO:

Now we will continue with some general questions.

To what extent do you agree or disagree with the following statements?

Response Style: Interpersonal Reactivity Index **RANDOMISE** *(don't show this title to respondents)*

E1	I often have tender, concerned feelings for people who are less fortunate than I.	1. Completely disagree 2. Disagree 3. Neutral 4. Agree 5. Completely agree 9. I don't know/Not applicable
E2	I sometimes find it difficult to see things from another person's point of view.	
E3	Sometimes I don't have much compassion for other people when they have problems.	
E4	I try to look at everybody's side of a disagreement before I make a decision.	

E5	Other people's misfortunes do not usually disturb me a great deal.
E6	I am often quite touched by things that I see happen.
E7	I believe there are two sides to every question and try to look at them both.
E8	Before criticizing somebody, I try to imagine how I would feel if I were in their place.

INTRO:

How do you perceive the potential risk to your health within the next 20 years from each of the following sources?

Risk Perceptions **RANDOMISE** (don't show this title to respondents)

RP1	Environmental pollution	1. No risk at all 2. Very low 3. Low 4. Moderate 5. High 6. Very high 9. I don't know/Not applicable
RP2	Radioactive waste	
RP5	An accident in a nuclear installation	
RP6	Natural radiation (from the soil or from space)	
RP7	The use of ionizing radiation for medical tests or treatments	
RP11	Climate crisis	
RP12a	SPLIT BALLOT (50% or respondents): Indoor air pollution due to radon	
RP12b	SPLIT BALLOT (50% or respondents): The presence of the naturally radioactive gas radon indoors	
RP20	Using recycled building material with low levels of radioactivity	

INTRO:

How much confidence do you have in the authorities for the actions they undertake to protect the population against risks from each of the following sources?

Confidence in Authorities **RANDOMISE** (don't show this title to respondents)

RC1	Environmental pollution	1. None 2. Very little 3. Little 4. Moderate 5. Quite a lot 6. Very much 9. I don't know/Not applicable
RC2	Radioactive waste	
RC5	An accident in a nuclear installation	
RC6	Natural radiation (from the soil or from space)	
RC7	The use of ionizing radiation for medical tests or treatments	
RC11	Climate crisis	
RC12a	SPLIT BALLOT (50% of respondents, those that received RP12a): Indoor air pollution due to radon	
RC12b	SPLIT BALLOT (50% of respondents, those that received RP12b): The presence of the naturally radioactive gas radon indoors	
RC20	Using recycled building material with low levels of radioactivity	

INTRO:

Now we are interested to hear what you think about the following issues:

Radon Awareness/ Salience (don't show this title to respondents)

RA1	Do you know anything about radon?	1. Yes 2. I have heard something about it 3. No 9. I don't know/Not applicable
SALI1	Radon may be a problem, but I haven't paid much attention to it because there are more important things to deal with.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable

RA1bis	IF RA1 = 1 or 2: Can you describe in a few words what you have heard about radon?	... [Open]
RA1.a	How confident are you in your knowledge related to radon?	1. Not at all confident 2. Somewhat confident 3. Moderately confident 4. Quite confident 5. Highly confident

INTRO IF RA1 = 1 or 2:

Do you agree or disagree with the following statements?

Radon Knowledge (RANDOMISED) (don't show this title to respondents)

AW37	Radon causes headaches.	1. Agree 2. Disagree 9. I don't know/Not applicable
AW38	Radon exposure is linked to lung cancer.	
AW39	Radon is a radioactive liquid.	
AW40	Radon has a strong odour.	
AW41	Radon is invisible.	
AW42	Radon levels are usually higher in the attic than the basement.	
AW43	Testing is the only way to determine if a home has an elevated radon level.	1. Agree 2. Disagree 9. I don't know/Not applicable
AW44	Radon can enter homes through cracks in walls and floors.	
AW45	Health effects of radon do not show for years.	
AW46	The risks from radon exposure increase the longer you are exposed to it.	
AW48	Concentrations of indoor radon are expressed in Watt.	
General knowledge (don't show this title to respondents) ALL (no filter) RANDOMISE INTRO: Do you agree or disagree with the following statements?		1. Agree 2. Disagree 9. I don't know/Not applicable
AW47	Exposure to radiation always leads to radioactive contamination.	

AW17	The human body is naturally radioactive.	
AW18	With time, every radioactive substance becomes more and more radioactive.	

VIDEO	<p>IF RA1 = 3 or 9 and if 1 or 2 less than 6 statements correct from AW37 to AW48 correct: Show video related to Radon:</p> <p>INTRO:</p> <p>We would like to show you a short video. Please, turn on your sound and watch it.</p> <p>https://www.youtube.com/watch?v=50fX56kZiww&feature=youtu.be</p>
INTRO	<p>INTRO for all</p> <p>Before we continue with the questionnaire we point out that a building can be tested for radon; it can be remediated if there is radon detected; or there can be preliminary protective measures installed when the building is built. We would like to ask you to share your opinion on this matter.</p>

Behavior (don't show this title to respondents)

RA2.1	Have you or has someone else ever tested your current residence for radon?	<p>1. Yes</p> <p>2. No</p> <p>9. I don't know/Not applicable</p>
RA2.2	FILTER: IF RA2. 1 = 1: Did the test result indicate there is a need to take further action?	<p>1. Yes</p> <p>2. No</p> <p>9. I don't know/Not applicable</p>
RA2.4	Have you or has someone else done something to remediate indoor radon in your current residence?	<p>1. Yes, building was remediated after discovering a radon problem</p> <p>2. Yes, preliminary protective measures were installed when the building was constructed</p> <p>3. No</p> <p>9. I don't know/Not applicable</p>

Type of remediation (don't show this title to respondents)

RA2.5	<p>FILTER: IF RA2.4 = 1 OR 2 : (multiple answers) Please, indicate all measures that have been applied in your current residence. (multiple answers possible)</p>	<ol style="list-style-type: none"> 1. Natural ventilation (e.g. open windows, vents etc.) 2. Ventilation system (forced ventilation system, heat recovery, air-to-air exchange) 3. Air suction installation (drain pipe, wall, sub-slab) 4. Sealing of existing cracks in the walls 5. Radon Membrane 6. Fixing cracks in foundations 7. Other 9. I don't know/Not applicable <p>RANDOMISE ANSWERING CATEGORIES except 7 and 9</p>
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Behavior intention (*don't show this title to respondents*)

RA5	(IF RA2.1=2 or 9 and IF RA2.4 = 3 or 9 = don't ask people that already remediated and/or tested) I intend to test radon concentrations in my home if advised.	<ol style="list-style-type: none"> 1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA5.1	(IF RA2.1=2 or 9 and IF RA2.4 = 3 or 9) I intend to measure radon in my home as a precaution.	
RA6	(IF RA2.4 = 3 or 9) I intend to start the remediation of my home if advised.	
RA8	(IF RA2.4 = 3 or 9 = only showing to people that have not remediated yet) I would do the necessary to remove radon if I am advised so.	

Can you tell us: Whether you know the following actors from the field of radon?

In your opinion: Are the following actors telling the truth about radon risks?

In your opinion: Are the following actors technically competent with regard to radon mitigation?

Not knowing an actor is a filter for "telling the truth" and "being technically competent"

"x" in first column = don't ask respondents if they know them (we assume they do, no need to ask)

RANDOMISE

	<i>NSTK Know them</i>	<i>NST Telling truth</i>	<i>NSC Technically competent</i>	
1. Public health authorities	x			Knowledge: <ol style="list-style-type: none"> 1. Yes 2. No Truth & competence: <ol style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neither agree, nor disagree
2. Environmental organisations such as Irish Environmental Network				
3. Department of Environment, Climate and Communications				

4. Medical doctors (family doctor, general practitioners ...)	x			4. Agree 5. Strongly agree 9. I don't know/Not applicable
12. Companies measuring radioactivity				
13. Environmental Protection Agency				
14. Contractors for remediation				
15. Scientists from Universities				

INTRO:

You are now approximately halfway the questionnaire.

To what extent do you agree or disagree with the following statements?

Severity for self (don't show this title to respondents)

RA12	Not acting when there is a high radon concentration in my house would be a severe threat to my health.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
CHECK1	For this statement please indicate “Agree”. This is a control question.	
RA12.1	Not undertaking any action against high radon concentration in my house would be life-threatening.	
Severity for others (don't show this title to respondents)		
RA12.2	If my neighbours had high radon concentrations and don't remediate their health would be in severe danger.	
RA12.3	If people in my community address the radon risk then they can avoid serious health issues due to radon.	

INTRO:

Now we would like to know your opinion about the health threat due to radon and how likely it is that radon causes health problems.

Susceptibility for self (don't show this title to respondents)

RA13	I believe that I can develop lung cancer due to radon if I don't tackle high concentration in my home.	1) Very unlikely 2) unlikely 3) somewhat likely 4) likely 5) very likely 9) I don't know/Not applicable
RA14	How likely do you think it is that you will get sick if you don't remediate high radon concentrations?	

RA14.1	I will remain healthy although I don't remediate high radon concentrations in my home.	
Susceptibility for others (don't show this title to respondents)		
RA15	How likely do you think people in your neighbourhood will get sick if they don't remediate high radon concentrations?	

INTRO:

To what extent do you agree or disagree with the following statements about remediation of the home due to radon?

Response Efficacy Remediation (<i>don't show this title to respondents</i>)		
RA17	Home remediation, if needed, offers effective protection against radon hazards.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA18.1	Home remediation, if needed, will fail to protect from high radon concentrations.	
RA19	A special installation would eliminate the radon hazard if needed.	
RA19.1	A special installation can NOT reduce radon to a safe level in homes that have a radon problem.	

INTRO:

To what extent do you agree or disagree with the following statements?

Response Efficacy Testing (don't show this title to respondents)		
RA21	I am confident that I would be able to test the indoor radon concentrations in my home if I wanted to.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
Self Efficacy Remediation (don't show this title to respondents)		
RA21.b	I am NOT confident that I will be able to effectively remediate my home if I wanted to.	
RA22	I am confident I would be able to hire a contractor to decrease the indoor radon concentration if I wanted to.	

Self Efficacy Obtaining Information (*don't show this title to respondents*)**RA33**

I am confident that in the case of high levels of radon in my home, I will find the information needed to protect myself.

INTRO:

To what extent do you agree or disagree with the following statements?

General Self-Efficacy (*don't show this title to respondents*)**RA22.c**

I can always manage to solve difficult problems if I try hard enough.

RA22.d

I can solve most problems if I invest the necessary effort.

RA22.e

When I am confronted with a problem, I can usually find solutions.

1. Strongly Disagree
2. Disagree
3. Neither agree, nor disagree
4. Agree
5. Strongly Agree
9. I don't know/Not applicable

Perceived Behavioural Control (*don't show this title to respondents*)**RA22.a**

I am confident that I could **afford** 50 euros to test for radon if needed.

RA22.b

I am confident that I could **afford 1000** euros to remediate for radon if needed.

1. Strongly Disagree
2. Disagree
3. Neither agree, nor disagree
4. Agree
5. Strongly Agree
9. I don't know/Not applicable

Perceived Burden (*don't show this title to respondents*)**RA23.1**

I believe reducing radon in my home would require more resources than I have.

RA23.2

I believe reducing radon would be burdensome for me.

Perceived Cost (*don't show this title to respondents*)**RA23**

I believe that the cost for remediation of my home to reduce the indoor radon concentration is low.

1. Strongly Disagree
2. Disagree
3. Neither agree, nor disagree
4. Agree
5. Strongly Agree

RA26	I guess I could easily obtain personal advice from a local expert on how to control the radon concentration in my home.	9. Don't know / no answer
Perceived Ease (don't show this title to respondents)		
RA24	I believe the procedure for radon testing my home is easy.	
RA25	I believe the procedure for remediating my home due to radon is difficult.	

Esthetic Impact (don't show this title to respondents)		
RA51	Remediation due to exceeded levels of radon would visually destroy my home.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
CHECK2	For this statement please indicate "Strongly Disagree". This is a control question.	
Economic Impact (don't show this title to respondents)		
RA51.b	A radon problem can influence the value of property.	

INTRO:

To what extent do you agree or disagree with the following statements?

Subjective Norm (<i>don't show this title to respondents</i>)		1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA34	Most people who are important to me are NOT in favour of me testing for indoor radon.	
RA34b	Most people who are important to me are in favour of me remediating my home for radon if needed.	
RA34.1	In general, people who are important to me would like me to be informed about radon.	
RA34.2	People who are significant in my life don't care about my actions related to radon in my home.	

Anticipated Emotion (<i>don't show this title to respondents</i>)		
RA28	FILTER: IF RA22.b = 3, 4, 5 I would feel regret if I had not remediated my home against radon and ended up getting lung cancer.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree
RA29	FILTER: RA22.b = 3, 4, 5 I would be ashamed not to remediate my home if indoor radon levels exceeded the limits.	

RA29.a	FILTER: IF RA22.b = 3, 4, 5 I would feel guilty about living in a home with high radon concentrations because I did not remediate it.	9. I don't know/Not applicable
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INTRO:

To what extent do you agree or disagree with the following statements?

Descriptive Norm RANDOMISE (don't show this title to respondents)		
RA35	I believe most people in my neighbourhood tested their houses for indoor radon.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA35a	I believe most people that I know do something related to indoor radon.	
RA36	I believe most people in my neighborhood remediated their houses when indoor radon levels exceeded the limits.	
RA37	As far as I know, most of my friends living in the same neighbourhood did NOT test their houses.	

Injunctive moral norms (don't show this title to respondents)		
IMN1	I think people in my community would consider testing for indoor radon a moral obligation.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
IMN2	I think others consider radon testing and remediation as a civic duty.	
IMN3	I think people in my community regard taking action against radon as morally right.	

Moral values (don't show this title to respondents)		
RA39	I think it is my moral duty to initiate remediation against indoor radon if advised.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA38	It is my responsibility as a household member to test indoor radon levels.	
RA38.a	It is NOT my responsibility as a household member to get my home remediated if necessary.	
RA38.b	Because of my personal values, I believe tackling the indoor radon problem is important.	

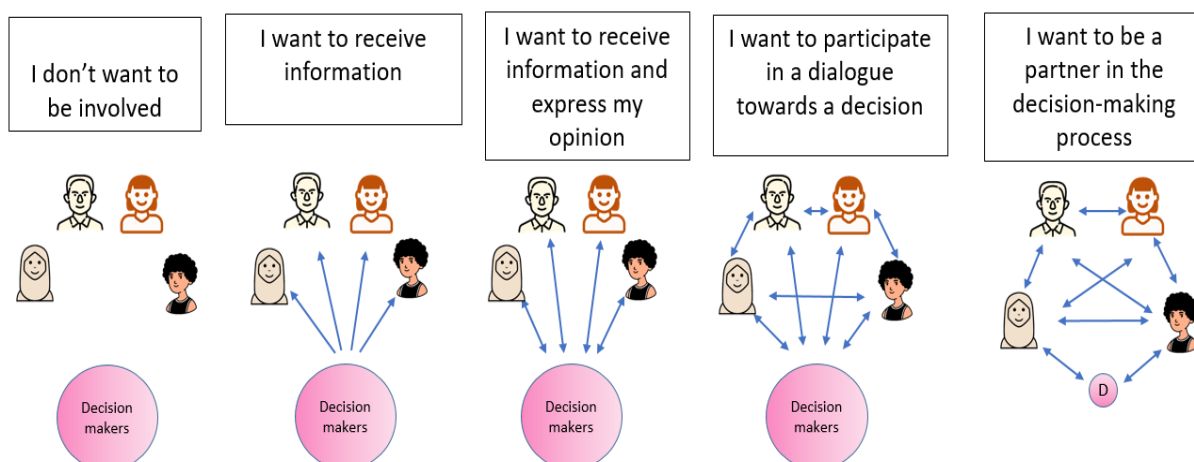
Health Effect Perception (don't show this title to respondents)		
RA37.1	I personally know people that may have health problems due to radon.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable

Stigma (<i>don't show this title to respondents</i>)		1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
ST1	I would feel embarrassed to have radon in my home.	
ST2	I would work hard to keep a radon problem a secret.	
ST3	Having radon in my house would make me feel like I'm a bad person.	
ST4	I would be very careful whom I would tell if I had a radon problem in my home.	

Social Influence RANDOMISE (<i>don't show this title to respondents</i>)		1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
SIS1	I don't watch others to learn new things	
SIS2	I don't compare myself to other people	
SIS3	I prefer to act the way everyone else is acting	
SIS4	When I realize people are working on something important to me, I also want to start doing it	
SIS5	I don't like to collaborate with people	
SIS6	I don't like to compete with people	
SIS7	I enjoy when my achievements are acknowledged in public	

Willingness to Engage

RA41	<i>If there would be an activity asking for input from the general public related to radon concentrations near your home, to what extent would you like to participate?</i>	SHOW GRAPHICAL CARD 1 = I don't want to be involved 2 = I want to receive information 3 = I want to receive information and express my opinion 4 = I want to participate in a dialogue towards a decision 5 = I want to be a partner in the decision-making process 999. I don't know/ no answer
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INTRO:

We are in the final part of the questionnaire. To what extent do you agree or disagree with the following statements related to information about radon?

Systematic Processing **RANDOMISE** (don't show this title to respondents)

INPR1	In order to be completely informed about home remediation, I think that the more viewpoints I get, the better off I will be.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
INPR2	I have been very attentive to the information related to radon remediation.	
INPR3	When the topic of radon remediation came up, I tried to learn more about it.	
INPR4	It was important for me to clarify how I should remediate my home.	
INPR5	When I encountered information about radon remediation of homes, I carefully considered it.	

Heuristic Processing **RANDOMISE** (don't show this title to respondents)

		1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
INPR6	On issues like radon home remediation I just go with my gut feeling.	
INPR7	Past experiences with health related issues have made it easier for me to form an opinion about the need to remediate my home.	
INPR8	On the matter of remediation I shall simply place my trust in the experts and respect their recommendations.	
INPR9	Related to decisions concerning radon remediation, I follow the people from my environment, e.g. family, neighbours.	
INPR10	I could easily form an opinion about the need to remediate my home without seeking additional information, based on my existing knowledge.	

Information comprehensiveness (don't show this title to respondents)

RA30	I don't feel well informed about which actions are needed related to indoor radon levels.	1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. I don't know/Not applicable
RA31	There is enough information for me to decide whether I should perform a radon test at home.	
Information uncertainty (don't show this title to respondents)		

RA50	Information about the health effect of radon is still too uncertain to take actions based on it.	
Affective Response to information (<i>don't show this title to respondents</i>)		
RA10	Information about radon makes me worry.	
RA11	Information about radon makes me nervous.	
Preference for Post-Survey Radon Information (<i>don't show this title to respondents</i>)		
MINF1	Which information channels would be the most appropriate for you, to receive more information about radon? (multiple answers possible)	! (multiple options) RANDOMISE 2-11 1. I am not interested in more information about radon 2. Television 3. Radio 4. Newspaper 5. Leaflet 6. Personalized information letter 7. Information from the school 8. Social Media 9. Meeting with the local community 10. Phone 11. Email 12. Other (please specify) 99. I don't know/Not applicable

DEBRIEF:

Thank you for taking part in this survey. This research was conducted by Environmental Protection Agency (EPA) in the context of the European research project RadoNorm. If you have any questions or concerns about this study and the research procedures used, you may contact Alison Dowdall at A.Dowdall@epa.ie. For more information about radon, testing and mitigation please consult internet page of EPA.

ANNEX – EIRCODES (S3)

A41 Ballyboughal
A42 Garristown
A45 Oldtown
A63 Delgany
A63 Greystones
A63 Kilcoole
A63 Newcastle
A63 Newtownmountkennedy
A67 Rathnew
A67 Wicklow
A75 Ballybay
A75 Castleblaney
A81 Carrickmacross
A82 Kells
A82 Kingscourt
A82 Virginia
A83 Enfield
A83 Summerhill
A84 Ashbourne
A85 Dunshaughlin
A85 Ratoath
A86 Dunboyne
A91 Dundalk
A92 Ardee
A92 Drogheda
A92 Laytown-Bettystown-Mornington
A94 Blackrock
A94 Booterstown
A94 Monkstown
A96 Glenageary
A98 Bray
C15 Navan
D01 Dublin 1 (most of the city centre north of the River Liffey)
D02 Dublin 2 (most of the city centre south of the River Liffey)
D03 Dublin 3
D04 Dublin 4, Dun Laoghaire Rathdown
D05 Dublin 5
D06 Dublin 6, Dún Laoghaire Rathdown
D07 Dublin 7
D08 Dublin 8
D09 Dublin 9
D10 Dublin 10
D11 Dublin 11, Fingal
D12 Dublin 12
D13 Dublin 13, Fingal
D14 Dublin 14, Dún Laoghaire–Rathdown, South Dublin
D15 Dublin 15, Fingal
D16 Dublin 16, Dún Laoghaire–Rathdown, South Dublin
D17 Dublin 17, Fingal
D18 Dublin 18, Dún Laoghaire–Rathdown
D20 Dublin 20, South Dublin
D22 Dublin 22, South Dublin
D24 Dublin 24, South Dublin

D6W Dublin 6W, South Dublin
E21 Cahir
E25 Cashel
E32 Carrick-on-Suir
E34 Tipperary
E41 Thurles
E45 Nenagh
E53 Roscrea
E91 Clonmel
F12 Claremorris
F23 Castlebar
F26 Ballina
F28 Westport
F31 Ballinrobe
F35 Ballyhaunis
F42 Roscommon
F45 Castlerea
F52 Boyle
F56 Ballymote
F91 Sligo
F92 Letterkenny
F93 Lifford
F94 Donegal
H12 Cavan
H14 Belturbet
H16 Cootehill
H18 Monaghan
H23 Clones
H53 Ballinasloe
H54 Tuam
H62 Loughrea
H65 Athenry
H71 Clifden
H91 Galway
K32 Balbriggan
K34 Skerries
K36 Malahide
K45 Lusk
K56 Rush
K67 Swords and Dublin Airport
K78 Lucan
N37 Athlone
N39 Longford
N41 Carrick-on-Shannon
N91 Mullingar
P12 Macroom
P14 Crookstown
P17 Kinsale
P24 Cobh
P25 Midleton
P31 Ballinacollig
P32 Donoughmore
P36 Youghal
P43 Carrigaline
P47 Dunmanway
P51 Mallow

P56 Charleville
P61 Fermoy
P67 Mitchelstown
P72 Bandon
P75 Bantry
P81 Skibbereen
P85 Clonakilty
R14 Athy
R21 Muine Bheag
R32 Portlaoise
R35 Tullamore
R42 Birr
R45 Edenderry
R51 Kildare
R56 Curragh Camp
R93 Carlow
R95 Kilkenny
T12 Cork (centre and southside), Passage West, Cork Airport
T23 Cork (northside), Blarney
T34 Whitechurch
T45 Little Island
T56 Watergrasshill
V14 Shannon
V15 Kilrush
V23 Caherciveen
V31 Listowel
V35 Kilmallock
V42 Newcastle West
V92 Tralee
V93 Killarney
V94 Limerick
V95 Ennis
W12 Newbridge
W23 Maynooth
W34 Monasterevin
W91 Naas
X35 Dungarvan
X42 Kilmacthomas
X91 Waterford
Y14 Arklow
Y21 Enniscorthy
Y25 Gorey
Y34 New Ross
Y35 Wexford